

**ANNUAL MANAGEMENT REPORT  
FOR THE  
SUBSISTENCE AND COMMERCIAL FISHERIES  
OF THE KUSKOKWIM AREA**

**1998**

**By:  
Charles Burkey Jr.  
Mike Coffing  
Jim Menard  
Douglas B. Molyneaux  
Paul Salomone  
Charles Utermohle  
Thomas Vania**

**Regional Information Report<sup>1</sup> No. 3A99-36**

**Alaska Department of Fish and Game  
Division of Commercial Fisheries  
AYK Region  
333 Raspberry Road  
Anchorage, Alaska 99518**

**November, 1999**

---

<sup>1</sup> The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports to this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

## **AUTHORS**

Charles Burkey Jr. is the Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 1467, Bethel, AK 99559-1467

Mike Coffing is the Resource Specialist for the Alaska Department of Fish and Game, Division of Subsistence, P.O. Box 1788, Bethel, AK 99559-1788

Jim Menard is the Assistant Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 1467, Bethel, AK 99559-1467

Douglas B. Molyneaux is the Kuskokwim Area Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Paul Salomone is the Assistant Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 1467, Bethel, AK 99559-1467.

Charles Utermohle is the Regional Biometrician for the Alaska Department of Fish and Game, Division of Subsistence, 333 Raspberry Road, Anchorage, AK 99518-1599

Thomas Vania is the Kuskokwim Area Sonar Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599

## **OEO/ADA Statement**

The Alaska Department of Fish and Game administers all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood, or disability. For information on alternative formats available for this and other department publications, contact the department ADA Coordinator at (voice) 907-465-4120, or (TDD) 907-465-3646. Any person who believes s/he has been discriminated against should write to: ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; or O.E.O., U.S. Department of the Interior, Washington, DC, 20240.



## ACKNOWLEDGMENTS

Many people contributed toward the collection and processing of the data used in this report. Alaska Department of Fish and Game employees worked long and irregular hours at various locations throughout the Kuskokwim Area collecting the data presented in this report. We thank Doug Bue, Chris Bach, Jon Becker, Valerie Bue, Stephen Blanchett, Tom Cappiello, Richard Chapell, Drew Cherry, Eddie Chris, Tim Drumhiller, Larry DuBois, Donna Elliot, Russ Holder, Rachael Klein, Brian Latham, Doug Lieb, Mike Martz, Susan McNeil, Philip Perry, Marianne Profita, Spencer Rearden, Louise Russell, Robert Stewart, Joe Whittom and Jeremy Woods. In addition, we would like to recognize Merrie Mendenhall, Glenda Schmierbach, and the other volunteers in the Kuskokwim Area. They provided valuable assistance by helping complete projects that were not funded. A special thanks goes to Bobbi Fisher, Fish and Game Administrative Clerk III, for compiling and proofreading this report. Salmon processors contributed data, communications, transportation and advice. We gratefully acknowledge the subsistence and commercial fishers who voluntarily provided their time, skill and knowledge. The department is very grateful to Jennifer Chris and her staff from the Association of Village Council Presidents, Angela Morgan and her staff from the Kuskokwim Native Association, Willard Church, Mark Wood and technicians from the Native Village of Kwinhagak, the students and staff of the Takotna Community School and the Bering Sea Fisherman's Association. Their participation in cooperative assessment projects provided welcome assistance and information important for management of the fishery. Staff from the Yukon Delta National Wildlife Refuge (United States Fish and Wildlife Service) provided meeting space and contributed to dialogue regarding fishery management and research. Staff from the Togiak National Wildlife Refuge provided assistance with escapement monitoring in Kuskokwim Bay and were active participants in fisheries discussions. U.S. Fish and Wildlife Service staff from the Kenai Fisheries Resource Office also provided support and contributed dialogue regarding salmon escapement projects.

## TABLE OF CONTENTS

<b>List of Tables .....</b>	<b>vi</b>
<b>List of Figures.....</b>	<b>viii</b>
<b>List of Appendices .....</b>	<b>ix</b>
<b>PREFACE.....</b>	<b>1</b>
<b>PART I. SALMON FISHERY .....</b>	<b>2</b>
Description of Area and District Boundaries .....	2
Fishery Resources .....	2
Management .....	3
<b>COMMERCIAL FISHERY.....</b>	<b>4</b>
Public Communications .....	4
Commercial Fishery Data .....	5
<b>SPORT FISHERY .....</b>	<b>6</b>
<b>ESCAPEMENT MONITORING AND ASSESSING RUN ABUNDANCE .....</b>	<b>6</b>
Aerial Surveys .....	7
Ground Based Escapement Assessment.....	7
Kuskokwim River .....	7
Kogrukluk River Weir .....	7
Aniak River Sonar.....	8
Other Kuskokwim River Escapement Projects.....	9
District 4.....	10
Kanektok River Tower.....	10
District 5.....	10
Middle Fork Goodnews River .....	10
Salmon Run Strength Assessment.....	11
Bethel Test Fishery .....	11
Commercial Catch Statistics .....	12
Subsistence and Sport Fish Information .....	12
Kuskokwim River Sonar.....	12
<b>SEASON SUMMARY .....</b>	<b>12</b>
Kuskokwim River (Districts 1 and 2).....	13
Chinook Salmon .....	16
Sockeye Salmon.....	17
Chum Salmon .....	17
Coho Salmon.....	18
Roe Sales.....	20

## TABLE OF CONTENTS (Continued)

Kuskokwim Bay .....	20
Quinhagak (District 4) .....	20
Goodnews Bay (District 5) .....	22
Enforcement .....	23
<b>OUTLOOK FOR 1999.....</b>	<b>23</b>
<b>Chinook Salmon .....</b>	<b>24</b>
Districts 1 and 2 .....	24
District 4.....	25
District 5.....	26
<b>Sockeye Salmon.....</b>	<b>27</b>
Districts 1 and 2 .....	27
District 4.....	27
District 5.....	28
<b>Chum Salmon .....</b>	<b>28</b>
Districts 1 and 2 .....	29
District 4.....	30
District 5.....	30
<b>Coho Salmon .....</b>	<b>31</b>
Districts 1 and 2 .....	31
Districts 4 and 5 .....	31
<b>SUBSISTENCE SALMON FISHERY .....</b>	<b>32</b>
Background .....	32
Eligibility, Licenses, Permits, and Gear.....	33
Inseason Subsistence Closures.....	33
<b>SUBSISTENCE SALMON HARVEST SURVEYS .....</b>	<b>33</b>
Methods.....	34
Catch Calendars .....	34
Household Surveys .....	35
Postcard Surveys.....	36
Telephone Surveys.....	36
Subsistence Salmon Harvest Estimation.....	37
1998 Sampling Summary .....	38
1998 Harvest Summary .....	39
<b>PART II: FRESHWATER FINFISH FISHERY .....</b>	<b>40</b>
Subsistence Fishery.....	40
Commercial Fishery.....	41
Stock Status .....	41

## TABLE OF CONTENTS (Continued)

<b>PART III: MISCELLANEOUS SALTWATER FINFISH .....</b>	<b>42</b>
<b>PART IV. HERRING FISHERY .....</b>	<b>42</b>
<b>INTRODUCTION .....</b>	<b>42</b>
Area and District Boundaries .....	42
Management Programs .....	42
Season Summary.....	43
<b>STOCK STATUS.....</b>	<b>44</b>
Assessment Methods .....	44
Spawning Populations .....	45
Security Cove District.....	45
Goodnews Bay District.....	45
Cape Avinof District.....	45
Nelson Island District .....	46
Nunivak Island District.....	46
Central Kuskokwim Bay.....	46
<b>SUBSISTENCE FISHERY .....</b>	<b>46</b>
<b>COMMERCIAL FISHERY.....</b>	<b>47</b>
Security Cove District.....	47
Goodnews Bay District .....	47
Cape Avinof District .....	48
Nelson Island District .....	48
Nunivak Island District .....	48
Enforcement .....	49
<b>OUTLOOK AND MANAGEMENT STRATEGY FOR 1999 .....</b>	<b>49</b>
Security Cove District.....	49
Goodnews Bay District .....	50
Cape Avinof District .....	50
Nelson Island District .....	50
Nunivak Island District .....	51
<b>LITERATURE CITED.....</b>	<b>52</b>

## LIST OF TABLES

1.	Salmon run assessment programs operated in the Kuskokwim Area during 1998.....	64
2.	Kuskokwim Area salmon entry permits issued by village, 1998.....	66
3.	Harvest and exvessel value of Kuskokwim Area salmon catch by district, 1998.....	67
4.	Executive summary of working group and department actions, 1998.....	68
5.	Salmon processors and associated data, Kuskokwim Area, 1998.....	74
6.	Commercial salmon harvest and fishing effort by period in Kuskokwim River Districts 1 and 2, and both districts combined, 1998.....	75
7.	Peak aerial survey salmon escapement estimates in Kuskokwim Area spawning tributaries by species, 1998.....	76
8.	Daily and cumulative estimates of fish passage at the Aniak River sonar site, 1998.....	77
9.	Quinhagak, District 4 commercial salmon harvest and effort by period, 1998.....	78
10.	Goodnews Bay, District 5 commercial salmon harvest and effort by period, 1998.....	79
11.	Preliminary outlook for the 1999 Kuskokwim Area commercial salmon harvest.....	80
12.	Kuskokwim Area subsistence salmon project sampling summary, 1998.....	81
13.	Kuskokwim Area subsistence salmon harvests, 1998.....	82
14.	Gear types reported used for subsistence salmon fishing in the Kuskokwim Area during 1998.....	83
15.	Salmon reported retained from commercial catches for subsistence use in the Kuskokwim Area, 1998.....	84
16.	Quality of subsistence salmon fishing in the Kuskokwim Area, 1998.....	85

### LIST OF TABLES (Continued)

17.	Kuskokwim area Pacific herring proportion of biomass by age class, 1998.....	86
18.	Kuskokwim area Pacific herring age frequency by district, 1998.....	87
19.	Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, Alaska, 1998.....	88
20.	Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, Alaska, 1999 .....	89
21.	1998 commercial salmon harvest and effort by period for statistical area 335-11 .....	90
22.	1998 commercial salmon harvest and effort by period for statistical area 335-12 .....	93
23.	1998 commercial salmon harvest and effort by period for statistical area 335-13 .....	96
24.	1998 commercial salmon harvest and effort by period for statistical area 335-14 .....	99

## LIST OF FIGURES

1.	Kuskokwim Area map showing salmon management districts and escapement monitoring projects.....	103
2.	Kuskokwim Management Area, District W-1 .....	104
3.	Kuskokwim Management Area, District W-2.....	105
4.	Kuskokwim Management Area, District W-4.....	106
5.	Kuskokwim Management Area, District W-5.....	107
6.	Kuskokwim River chinook salmon escapement index, 1975-1998 .....	108
7.	Relationship between annual coho salmon escapement at the Kogruklu River weir and the annual average commercial CPUE in District 2 between August 1 and August 21, 1985-1998.....	109
8.	Goodnews Bay and Security Cove herring districts.....	110
9.	Cape Avinof herring district.....	111
10.	Nelson Island herring district .....	112
11.	Nunivak Island herring district.....	113
12.	Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1998.....	114

## LIST OF APPENDICES

### APPENDIX A

A.1. Fish species commonly found in the Kuskokwim Area.....	116
A.2. Historic events, which have potential or actual, influence on the commercial salmon fisheries of the Kuskokwim Area.....	117
A.3 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon .....	121
A.4. Kuskokwim Area commercial, subsistence and personal use salmon catches, 1913-1998 .....	122
A.5. Commercial Fishing Effort in Permit-Hours for the Kuskokwim Area, 1960-1998.....	125
A.6. Estimated exvessel value of the Kuskokwim Area commercial salmon fishery, 1964-1998.....	126
A.7. Historical salmon escapement data from selected Kuskokwim Area projects, 1976-1998 .....	127
A.8. Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967-1998 .....	129
A.9. Maximum, mean, and minimum number of permits used in a single period by district, 1962-1998 .....	130
A.10. Kuskokwim Area subsistence chinook salmon harvest by community, 1960-1998.....	131
A.11. Kuskokwim Area subsistence sockeye salmon harvest by community, 1985-1998.....	135
A.12. Kuskokwim Area subsistence coho salmon harvest by community, 1985-1998.....	137
A.13. Kuskokwim Area subsistence chum salmon harvest by community, 1985-1998.....	139



## LIST OF APPENDICES (Continued)

### APPENDIX B

B.1. Kuskokwim River distances .....	142
B.2. Utilization of chinook salmon in the Kuskokwim River, 1960-1998 .....	144
B.3. Peak aerial survey counts of chinook salmon in indexed Kuskokwim River spawning tributaries, 1975-1998 .....	145
B.4. Historical daily CPUE for chinook salmon catches in the Bethel test fishery, 1984-1998.....	146
B.5. Historical daily cumulative CPUE for chinook salmon catches in the Bethel test fishery, 1984-1998.....	148
B.6. Historical cumulative daily percent passage for chinook salmon catches in the Bethel test fishery, 1984-1998.....	150
B.7. Historical daily CPUE for sockeye salmon catches in the Bethel test fishery, 1984-1998.....	152
B.8. Historical cumulative daily CPUE for sockeye salmon catches in the Bethel test fishery, 1984-1998.....	154
B.9. Historical cumulative daily percent passage for sockeye salmon catches in the Bethel test fishery, 1984-1998.....	156
B.10. Historical daily CPUE for coho salmon catches in the Bethel test fishery, 1984-1998.....	158
B.11. Historical cumulative daily CPUE for coho salmon catches in the Bethel test fishery, 1984-1998.....	159
B.12. Historical cumulative daily percent passage for coho salmon catches in the Bethel test fishery, 1984-1998.....	160
B.13. Historical daily CPUE for chum salmon catches in the Bethel test fishery, 1984-1998.....	161
B.14. Historical cumulative daily CPUE for chum salmon catches in the Bethel test fishery, 1984-1998.....	163

## LIST OF APPENDICES (Continued)

B.15. Historical cumulative daily percent passage for chum salmon catches in the Bethel test fishery, 1984-1998.....	165
B.16. Historical commercial salmon harvest in the Kuskokwim River, Districts 1 and 2 combined, 1960-1998.....	167
B.17. Utilization of chum salmon in the Kuskokwim River, 1960-1998 .....	168
B.18. Historical commercial salmon catches by fishing period in Kuskokwim Area District 1, 1974-1998 .....	169
B.19. Historical commercial salmon catches by fishing period in Kuskokwim Area District 2, 1974-1998 .....	177
B.20. Historical commercial salmon harvest by statistical area in District 1, 1974-1998.....	181
B.21. Estimated historical daily fish passage at George River weir .....	182
B.22. Estimated historical daily cumulative fish passage at George River weir .....	184
B.23. Estimated historical daily cumulative percent fish passage at George River weir .....	186
B.24. Estimated historical salmon passage at Takotna River tower .....	188
B.25. Daily salmon passage at Tatlawiksuk River weir in 1998 .....	189
B.26. Kuskokwim River, District W-1, commercial catch and CPUE comparisons .....	190
B.27. Factor table for historical estimates, Kogrukluk River 1976-1998 .....	191
B.28. Historical daily actual escapement of chinook salmon at the Kogrukluk River weir for years with similar data compared to 1998 .....	192
B.29. Historical daily actual escapement of sockeye salmon at the Kogrukluk River weir for years with similar data compared to 1998 .....	193
B.30. Historical daily actual escapement of chum salmon at the Kogrukluk River weir for years with similar data compared to 1998 .....	194

## LIST OF APPENDICES (Continued)

B.31	Historical daily actual escapement of coho salmon at the Kogrukluk River weir for years with similar data compared to 1998 .....	195
------	----------------------------------------------------------------------------------------------------------------------------------	-----

### APPENDIX C

C.1.	Quinhagak District commercial effort 1970-1998 .....	197
C.2.	Historical commercial effort by salmon species caught in Quinhagak District, 1975-1998.....	198
C.3.	Quinhagak District commercial salmon harvest, 1960-1998 .....	199
C.4.	Kanektok River aerial surveys by species, 1962-1998.....	200
C.5.	Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1998 .....	201
C.6.	Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1998 .....	203
C.7.	Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1998 .....	205
C.8.	Summary of historical commercial harvest by period, Quinhagak District, coho salmon, 1981-1998 .....	207

### APPENDIX D

D.1.	Goodnews Bay District commercial effort 1970-1998 .....	210
D.2.	Historical commercial effort by salmon species caught in Goodnews District, 1975-1998.....	211
D.3.	Goodnews Bay District commercial salmon harvest, 1968-1998 .....	212
D.4.	Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1998.....	213
D.5.	Aerial survey results, Goodnews River 1980-1998.....	215
D.6.	Summary of historical commercial harvest by period, Goodnews Bay District, chinook salmon, 1981-1998 .....	216

## LIST OF APPENDICES (Continued)

D.7.	Summary of historical commercial harvest by period, Goodnews Bay District, sockeye salmon, 1981-1998 .....	218
D.8.	Summary of historical commercial harvest by period, Goodnews Bay District, chum salmon, 1981-1998 .....	220
D.9.	Summary of historical commercial harvest by period, Goodnews Bay District, coho salmon, 1981-1998 .....	222

### APPENDIX F

F.1.	Commercial freshwater finfish fishery catch data, Kuskokwim Area, 1977-1998.....	225
------	----------------------------------------------------------------------------------	-----

### APPENDIX G

G.1.	Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1998 .....	227
------	------------------------------------------------------------------------------------------------	-----

### APPENDIX H

H.1.	Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area.....	229
H.2.	Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1998.....	231
H.3.	Commercial harvest, effort and value of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1998 .....	233

### APPENDIX S

S.1.	1998 Kuskokwim Area subsistence salmon harvest calendar .....	236
S.2.	1998 Kuskokwim Area subsistence salmon harvest survey form .....	238
S.3.	1998 Kuskokwim Area subsistence salmon harvest survey postcard .....	240

## PREFACE

The Division of Commercial Fisheries (CF) of the Alaska Department of Fish and Game (ADF&G) is responsible for the management of commercial and subsistence fisheries in the Kuskokwim Area. This annual management report details the activities of the CF Division in the Kuskokwim Area in 1998.

This report is one of a series of Annual Management Reports detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area report series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. The Annual Management Report became a part of the Regional Information Report Series in 1987.

Data presented in this report supersede information found in previous management reports. This report includes summary data from many research projects. Complete documentation of these projects and results appear in separate reports. The bibliography includes both referenced and unreferenced reports concerning the Kuskokwim Area fisheries. Some of the data presented are preliminary and may be presented with minor differences in future reports.

To simplify use of this report, the tabular data are separated into current year tables and appendices of historic data. The appendices are separated by fishery and fishing district. The appendices show annual comparisons and information that seldom change.

The ages of fish in this report are presented as both total age, year spawned to year recorded and in the European notation. In the European system, the number of winters in fresh water after hatching is followed by the number of winters in salt water. The fresh and salt-water winters are separated by a decimal point. To derive total age from the European system you must add the fresh and salt water winters and add one for the year of spawning. For example an age-1.3 chinook salmon's total age is 5 years;  $1+3+1=5$ .

Important subsistence and commercial fisheries in the Kuskokwim Area include herring and salmon. Other marine and freshwater finfish are harvested primarily for subsistence use. A list of indigenous fishes found in the Kuskokwim Area is provided in Appendix A.1.

## **PART I. SALMON FISHERY**

### ***Description of Area and District Boundaries***

The Kuskokwim Area includes the Kuskokwim River drainage basin and all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1, the Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and Popokamiut, upstream to a line between ADF&G regulatory markers located at Bogus Creek, about nine miles above the Tuluksak River (Figure 2). The downstream boundary has been in effect since 1986 and the upstream boundary was established in 1994 (Appendix A.2).

District 2, the Middle Kuskokwim River, consists of the Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the regulatory markers at Chuathbaluk (Figure 3). The downstream boundary of District 2 was used for the first time in 1990 (Appendix A.2).

District 4, Quinhagak, consists of the waters of Kuskokwim Bay between the mouth of Weelung Creek (misspelled in the regulations as Wheeling) and the South Mouth of the Arolik River (Figure 4). The northern boundary was new in 1990 and the first boundary change since 1960 (Appendix A.2).

District 5 consists of the waters of Goodnews Bay (Figure 5). The District 5 boundaries are a line between the northernmost tip of South Spit and the southernmost tip of North Spit, and a line between the mouth of Ukfigag Creek and the mouth of the Tunulik River.

The letter code assigned to the Kuskokwim Area by the Commercial Fisheries Entry Commission is "W". It precedes the district number on the figures and in news releases (e.g. W-1). This helps the public differentiate between announcements for the Yukon River districts (Y) and the Kuskokwim River (W) districts.

### ***Fishery Resources***

Five species of Pacific salmon are harvested by commercial and subsistence fishers in the area; chinook or "king" salmon (*Oncorhynchus tshawytscha*), sockeye or "red" salmon (*O. nerka*), coho or "silver" salmon (*O. kisutch*), pink or "humpy" salmon (*O. gorbuscha*), and chum or "dog" salmon (*O. keta*). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon occur throughout the area with significantly larger returns in even years than in odd years. Little quantitative data on the population size of pink salmon is available because of the lack of commercial markets and interest by subsistence fishers. There are no commercial fisheries for rainbow trout (*O. mykiss*), sheefish (*Stenodus leucichthys*) or Dolly Varden (*Salvelinus malma*) in the Kuskokwim Area.

Their contribution to the subsistence fishery is not well quantified, except in the Kwethluk (Coffing 1991) and Kanektok Rivers (Wagner 1991). There is a growing sport fishery targeting salmon and resident freshwater fish (Minard et al 1998).

### ***Management***

Management of the Kuskokwim Area salmon fishery is complex because of the difficulty in determining run size and timing, harvesting of mixed stocks, overlapping multispecies salmon runs, allocation issues, and the immense size of the Kuskokwim River drainage (Appendix B.1). The overall goal of the Kuskokwim Area research and management programs is to manage the salmon runs for sustained yield under policies set forth by the Alaska Board of Fisheries. Information is not adequate at this time to determine the escapement levels needed to produce maximum sustained yield. The Alaska State Legislature and the Alaska Board of Fisheries have designated subsistence fishing as the highest priority among beneficial uses of the resource (A.S. 16.05.258). Management of the Kuskokwim Area commercial salmon fisheries must take a conservative approach to maintain the subsistence priority, and to provide for spawning area escapements to sustain production of the resource (Appendix A.3).

Most fisheries within the Kuskokwim Area harvest salmon stocks that are several weeks and hundreds of miles from their spawning grounds. As with most mixed stock fisheries, some individual stocks may be under harvested or over harvested in relation to their abundance. It is not practical, except in a very generalized sense, to manage the stocks separately based on current knowledge.

The management objective for chinook, coho and chum salmon in Districts 1 and 2 is to achieve desired escapement objectives (Appendix A.3) and allow for the orderly harvest of fish surplus to spawning requirements. Sockeye and pink salmon are not actively managed in Districts 1 and 2. The management objective for chinook, coho and sockeye salmon in Districts 4 and 5 is to achieve desired escapement objectives (Appendix A.3) and allow for the orderly harvest of fish surplus to spawning requirements. Chum and pink salmon are not actively managed in Districts 4 and 5. Inseason management depends heavily on commercial catch data, test fisheries and run timing information. Run timing models are used inseason to predict the final escapement using the historical percentage of run passage for a particular date.

CF permanent full time staff assigned to the Kuskokwim Area includes one area management biologist, two assistant area management biologists, two research project biologists and one field office assistant. In addition, approximately 25 seasonal employees are hired annually to assist in conducting various management and research projects. The staff aids in the enforcement of regulations in cooperation with the Department of Public Safety, Division of Fish and Wildlife Protection (FWP). Staff has also had increasing involvement with various non-profit groups and the United States Fish and Wildlife Service to develop and operate salmon escapement monitoring projects (Table 1).



## COMMERCIAL FISHERY

The Kuskokwim Area commercial salmon fishery dates back to the late 1800s. In the early years of the fishery, most of the commercial catch was sold locally for dog food (Oswalt 1990, Brown 1983). Salmon have been harvested in the Kuskokwim Area for export since 1913 (Pennoyer 1965). The current system of fishing districts, formerly called subdistricts, began in 1960 for the Kuskokwim River and District 4 (Appendix A.2). District 5 was established in 1968. The Kuskokwim River chum salmon fishery began in 1971 with gillnet mesh size restricted to 6 inches or smaller after 25 June. In Districts 4 and 5, gillnet mesh size has been restricted to 6 inches or smaller since formal inception of the districts. In 1985, the 6-inch maximum gillnet mesh size was applied to all Kuskokwim Area commercial salmon fisheries. The directed chinook salmon fishery in the Kuskokwim River was discontinued in 1987 (Appendix A.2).

Prior to 1983, a management strategy of conservatively increasing the commercial harvest guidelines to establish definite trends between catch and escapement allowed development of the fishery. Since change from a harvest-guideline-based management strategy to an escapement-objective-based strategy in 1983, average harvests have generally increased (Appendix A.4). The only stock in the Kuskokwim Area that is a management concern<sup>2</sup> is Goodnews Bay chinook salmon. The failure of Aniak River chum salmon to reach its escapement objective in 1992 and 1993 has and will continue to require special management measures in the 1996 through 1998 return years to prevent the creation of a management concern.

Coho salmon are the most important species in the commercial fishery both in terms of harvest numbers and value to the fishers. The commercial fisheries in all four districts target coho in late July and August. Chum salmon are second in importance being the target species in the Kuskokwim River fisheries in June and July. Sockeye salmon are the third most commercially important species with directed fisheries in Districts 4 and 5. Chinook catch and value ranks fourth with the only directed commercial fishery on this species occurring in District 4. Pink salmon are the least numerous and least valuable species in the commercial fishery.

### ***Public Communications***

Communicating management plans and decisions to the public is often challenging because many people in the Kuskokwim Area speak only Yupik, or English as a second language. Special regulation notices are broadcast over local radio stations, VHF and CB radio in English and Yupik. The department and the Kuskokwim River Salmon Management Working Group (Working Group) relationship has dramatically improved the acceptance and understanding of fisheries management by many users. The Department participates in school and workshop programs in the winter. News releases are now more widely distributed through a computerized FAX and e-mail system.

---

<sup>2</sup> A management concern is a stock that fails to reach its escapement objective despite repeated proactive management measures.



## ***Commercial Fishery Data***

Catch per unit of effort (CPUE) is used in this report to describe the relative success of fishing and as an index of abundance. Commercial CPUE is the catch during a fishing period divided by the product of the number of unique CFEC permits used in a fishing period and the total number of hours the district was open to commercial fishing. Commercial CPUE is the number of fish caught per permit-hour in this report.

Computer tabulations of fish tickets provide the commercial catch data presented in this report. The computer software program is a statewide system provided by the Commercial Fisheries Division Computer Services section.

The commercial fishery has expanded during the last 15 years (Appendix A.5). This expansion is due to increased participation by individual fishers and improvements in fishing gear, tendering, and processing capabilities, and a shift to escapement based management. In 1995, a record 829 of the 840 permit holders made at least one landing (Appendix A.6). Since 824 permit holders fished in 1989 and 1990, the number of active permits had declined slightly until 1995 (Appendix A.6). Since 1995, the number of participating permit holders has decreased considerably due primarily to a significant drop in the prices paid for salmon. Kuskokwim Area permit holders can transfer freely between commercial fishing districts.

Appendix A.5 shows that permit-hours peaked in 1975; probably due to the impending limited entry permit moratorium. Since that time, maintaining adequate subsistence harvests and average spawning escapements required reductions in fishing time. Fishing efficiency has increased, as the increase in harvest (Appendix A.4) and the decrease in permit-hours (Appendix A.5) shows. Improved run strength, escapement based management, and increased participation resulted in permit-hours stabilizing to around 100,000 from 1987 to 1995 (Appendix A.5). In 1998, permit-hours were 48% below the most recent 10-year (1988-1997) average in Districts 1 and 2 because of limited fishing time due to weak chum and coho salmon returns and lower participation caused by low prices. Permit-hours were 34% below average in District 5 primarily due to low prices. The number of permit-hours in District 4 was 23% below the recent 10-year average.

Commercial fishing regulations set maximum gillnet specifications of 6-inch or smaller mesh, 50 fathoms in length and 45 meshes in depth for all districts (ADF&G 1995). Fishing periods in Districts 1 and 2 are usually six hours in duration from 1:00 p.m. until 7:00 p.m., as required by the management plan. Longer fishing periods generally divide the extra time before 1:00 p.m. and after 7:00 p.m. In Districts 4 and 5 fishing periods are normally 12 hours in length. Fishers in those two districts prefer daylight fishing hours so the periods are normally 9:00 a.m. until 9:00 p.m.

Adjustments of the number and duration of commercial fishing periods and time intervals between periods are the primary methods of distributing the harvest throughout the run. This helps to avoid over harvesting discrete stocks, achieve biological escapement goals (BEG's), and allows sufficient fishing time for the subsistence fishery. In 1998, commercial fishing periods varied between 6 and 12 hours in length depending on the district, species, effort, run magnitude

and processing capacity. Run magnitude is assessed by commercial and subsistence catch data and by various department, non-profit organization, USFWS and industry sponsored projects.

Kuskokwim Area fishers owned 97% of the 830 commercial permits renewed in 1998 (excluding educational permits held by local schools) while non-local Alaskan residents owned 2% (15). Non-residents owned only 6 permits (Table 2).

## **SPORT FISHERY**

The Sport Fish Division in Dillingham manages all sport fisheries from the Goodnews River to and including the Aniak River drainage on the mainstem Kuskokwim. The Sport Fish Division in Fairbanks manages the remaining Kuskokwim River drainages. Overall, sport fishing activity and harvest in the Kuskokwim Area is relatively low, but growing. The number of angler-days has increased from 11,358 in 1985 to 21,247 in 1997 (Minard et. al. 1998). Moderate sport fishing activity occurs in the Kanektok, Goodnews, Kisaralik, Kwethluk and Aniak Rivers, which account for the majority of the angler-days in the Kuskokwim Area.

## **ESCAPEMENT MONITORING AND ASSESSING RUN ABUNDANCE**

The vast size, remoteness and fluvial diversity of the Kuskokwim Area presents tremendous challenges to monitoring salmon escapements and assessing run abundance. Aerial spawning ground surveys have been the most cost-effective means of monitoring salmon escapements, but their usefulness and reliability are limited. Aerial survey assessment is subject to a high degree of variability. The more thorough and rigorous ground based projects such as weirs, counting towers and sonar have been operated in only a few locations because of costs and limited budgets. Over the past few years, however, ADF&G has been able to expand the number of weir and counting tower projects in the Kuskokwim Area through cooperative partnerships other organizations (Table 1). These cooperative efforts have added substantially to our ability to monitor salmon escapements and to evaluate the effectiveness of inseason management actions.

Salmon managers require timely assessments of run abundance in order to effectively manage commercial and subsistence fisheries without jeopardizing escapement needs. Within the Kuskokwim River, escapement projects have limited usefulness for inseason management because of the great distances between the areas of harvest and the location of escapement projects. It may take weeks for salmon to travel between these locations. As a consequence, managers in the Kuskokwim River rely on a variety of inseason indicators to assess run abundance including test fisheries, commercial catch statistics and anecdotal information from subsistence and sport fishers. In Kuskokwim Bay the escapement monitoring projects are a short distance from the commercial fishing districts, so escapement data can have a more direct inseason application. Kuskokwim Bay managers also make extensive use of commercial catch statistics and information from subsistence fishers.

## ***Aerial Surveys***

Many of the escapement goals established for Kuskokwim Area streams in 1983 were based on aerial surveys. Biological escapement goals (BEG's) is a more recent term applied to escapement objectives (Buklis 1993). Kuskokwim Area BEG's based upon aerial surveys do not represent the entire spawning populations in the respective streams. The surveys are mostly conducted one time each season during a window of a few days when the maximum number of fish are expected to be on the spawning grounds. The BEG's developed from these surveys are based on the raw, unexpanded counts, therefore each count serves as an index of abundance rather than a census.

Aerial surveys are ordinarily restricted to clear water streams and lakes, the distribution of which is geographically skewed towards the lower Kuskokwim River basin and coastal streams. Tributaries in the middle and upper Kuskokwim River are oftentimes tannin stained or clouded by glacier runoff, both of which markedly reduce the visibility of fish. The list of streams with BEG's reflects the uneven geographic distribution of escapement monitoring (Appendix A.3).

In most cases, aerial surveys are best used to index spawning populations of sockeye and large chinook salmon because they are more visible. Some streams do have aerial survey-based BEG's for chum salmon (Buklis 1993), but these are of questionable usefulness because of protracted run timing and the low visibility of chum salmon on the spawning grounds. A few streams also have BEG's for coho salmon, but weather conditions seldom allow reliable aerial surveys to be flown for this species.

## ***Ground Based Escapement Assessment***

Weirs, counting towers and sonar projects operated in the Kuskokwim Area allow estimation of entire spawning populations, or at least major segments of those populations. Eight such projects were operated in the Kuskokwim Area in 1998 (Figure 1). Three of the projects have BEG's associated with them, but only one, the Kogrukluk River weir, has a BEG for coho salmon (Appendix A.3). Most of the BEG's are based on the average annual escapements at each site through about 1983 (Buklis 1993). BEG's are periodically reviewed and may be modified when appropriate. Other information collected at ground based projects may include salmon sex and length composition, scales for age determination, statistics on the occurrence of gillnet marks on fish, genetic stock identification sampling, information on resident species, and habitat monitoring.

## ***Kuskokwim River***

### ***Kogrukluk River Weir***

The Kogrukluk River is a middle Kuskokwim River tributary located in the upper reaches of the Holitna River drainage (Figure 1). The Department has operated a weir on the Kogrukluk River since 1976 to monitor passage of chinook, sockeye, chum and coho salmon (Cappiello 1998a). The BEG for each of these species is 10,000, 2,000, 30,000 and 25,000 fish, respectively. Sockeye are considered incidental at the site, but since the project was first established the annual trend has been towards increasing sockeye abundance (Appendix A.7). In fact, annual sockeye passage sometimes exceeds the abundance of other species. Kogrukluk River weir is the only project in the

Kuskokwim Area where coho escapement is regularly monitored. In 1998 the start of the project was delayed a few weeks due to high water, but the weir was operable for the entire coho run.

One of the earliest escapement monitoring projects in the Kuskokwim Area was a counting tower operated on the Kogrukluk River from 1969 through 1976 (Yanagawa 1972a, and 1973, Kuhlmann 1973, 1974, 1975; Baxter 1976 and 1977). The Department first tried to weir the river in 1971, but was unsuccessful (Yanagawa 1972b). Both the tower and the 1971 weir site were located several miles upstream of the current weir project. The early projects were also upstream of Shotgun Creek, a productive salmon spawning ground. The current weir site is downstream of Shotgun Creek.

Travel time for chum and coho salmon from the upper end of District 1 to the weir is estimated at about 25 days based on tagging studies conducted in the early 1960s (ADF&G 1961a and 1962a). Inseason escapement projection models have been developed to estimate the end-of-season escapements (Cappiello 1998a), but their usefulness is generally very limited because of variability in salmon entry patterns.

### **Aniak River Sonar**

Aniak River is located in the lower Kuskokwim River basin and is believed to be one of the largest producers of chum salmon in the Kuskokwim Area (Figure 1). The Department began a sonar project on the river in 1980. Non-configurable sonar equipment was used from 1980 through 1995. A transducer was deployed from one bank and passage in the unensounded section of the river was estimated using an expansion factor (Schneiderhan 1989). Results from the 1995 operations were considered unusable because of abnormalities in the operation that could not be resolved (Burkey et al. 1996b). The problem was associated in part to the limited crew experience, but also at fault was the lack of documentation inherent with non-user configurable sonar. In 1996 the project was redesigned to take advantage of user-configurable sonar technology (Vania 1998). At the same time the project was relocated about a mile downstream where a transducer was deployed from each bank to allow full channel ensounding. The Association of Village Council Presidents has provided a technician to assist in field operations every year since the user configurable sonar was deployed. The high water levels that plagued other projects in 1998 also forced the temporary cessation of the Aniak River sonar project for five days towards the middle of the run.

The sonar passage estimates for the Aniak River include a mix of species, however the operating period focuses on a time span from late June through late July when the majority of fish passage is believed to be chum salmon. This assumption has generally been confirmed through periodic netting activities (Schneiderhan 1989, Vania 1998). During the first few years of operation fish passage was apportioned to chum and chinook salmon using the proportion of each species caught in gillnets (Schneiderhan 1981, 1982a, 1982b, 1984c). Species apportionment was discontinued after 1986 because of inadequate sample sizes gillnet selectivity and the perceived dominance of chum salmon (Schneiderhan 1989).

The BEG for Aniak River sonar is 250,000 fish counts (Buklis 1993). Area biologists derived the goal subjectively in the early 1980s by relating the sonar passage estimates to trends in harvest and other escapement indices (Schneiderhan 1984c). In the years that followed, periodic consideration



of the BEG provided no compelling reason to change the goal. The median annual fish passage estimates during the years when the project was operated from one bank with non-configurable equipment was 253,000 fish (Appendix A.7). The average passage estimate for the past three years with the user configurable equipment is 282,000 fish. The BEG of 250,000 fish has been carried forward to the redesigned sonar project, but it will be reassessed as more information is gathered.

The travel time for chum salmon from the upper end of District 1 to the Aniak River sonar site is estimated at about 7 or 8 days based on tagging studies (ADF&G 1961a and 1962a).

### **Other Kuskokwim River Escapement Projects**

A number of other escapement projects have been operated periodically in the Kuskokwim drainage. The most intensive efforts occurred in the past few years through cooperative efforts with the U. S. Fish and Wildlife Service (USFWS), the Bering Sea Fishermen's Association (BSFA) and other organizations. Cooperative escapement projects were operated in 1998 on the Kwethluk, George, Tatlawiksuk and Takotna Rivers through partnerships with the Association of Village Council Presidents, Kuskokwim Native Association, and Takotna Community School (Figure 1). These groups received federal funding through grants obtained by the BSFA, Bureau of Indian Affairs and the National Fish and Wildlife Foundation. The Department and USFWS worked jointly to provide varying levels of support to each project ranging from an on-site crew leader to equipment and technical guidance.

The George River weir (Molyneaux et al. 1997b) and the Kwethluk River tower (Cappiello and Sundown 1998b) were each in their third year of operation; Takotna River tower was in its fourth year. This was the first year of operation for the Tatlawiksuk River weir. The operational periods for the George, Tatlawiksuk and Kwethluk River projects were intended to span the chinook, chum and coho salmon runs, however high water conditions forced a premature end to the projects very early in the season. The Kwethluk River counting tower also had a delayed start-up at the beginning of the season. The Takotna River tower was intended to operate through the chinook and chum salmon season, but high water forced an early end to the season. None of the cooperative projects have BEG's associated with them as of yet. Annual funding of for the cooperative projects is always tenuous, however as of this writing all four projects are expected to operate in 1999. Plans are also underway to upgrade the George and Tatlawiksuk River projects from the current fixed aluminum picket weirs to a resistance board weir design that is better able to withstand periodic high water events of moderate magnitude.

Other escapement monitoring projects operated in the Kuskokwim River basin over the years include: South Fork Salmon River weir in 1981 and 1982 (Schneiderhan 1982b, 1982d), experimental sonar deployment in the Kwethluk and Kasigluk Rivers in 1978 and 1979 (Schneiderhan 1979,1980), and resistance board weirs on the Kwethluk in 1992 (Harper 1998) and Tuluksak Rivers from 1991-1994 (Harper 1995a, 1995b, 1995c, 1997), which were operated by the USFWS. All of these projects were discontinued due to funding shortages, technical limitations, or lack of local support.

## **District 4**

### **Kanektok River Tower**

The Kanektok River is the main spawning stream in District 4 (Figure 1). Historically, aerial surveys have been the primary means of assessing salmon escapements in the river. An experimental counting tower was initiated with little success in the lower Kanektok River in 1996 (Fox 1997). The project was operated through a cooperative effort between Quinhagak IRA and ADF&G, with support from BSFA, USFWS and the Bureau of Indian Affairs (BIA). Improvements were made to the tower operation in 1997 (Menard and Caole 1998b). The changes, coupled with near record low water levels, allowed for moderate success in enumerating chinook, sockeye, chum and pink salmon, however, reliable species identification was difficult. Water levels in 1998 returned to a more average to above average range in the Kanektok River and the tower was essentially inoperable. The counting tower is not expected to operate in 1999, instead efforts are being redirected to the development of a resistance board weir for the Kanektok River.

Counting towers and non-configurable sonar equipment have been used in the past to estimate salmon escapement in the Kanektok River, but these projects were discontinued due to site limitations, technical obstacles and budget reductions (tower: ADF&G 1960, 1961b and 1962b; sonar: Schultz and Carey 1982, Schultz and Williams 1984, Huttunen 1984c, 1985c, 1986a, 1988).

## **District 5**

### **Middle Fork Goodnews River**

The Goodnews River is the primary salmon spawning stream in District 5. Salmon escapements are assessed in the drainage by means of aerial surveys and a weir on the Middle Fork Goodnews River (Figure 1). The weir is located about 15 miles from the eastern boundary of the commercial fishing district allowing for timely assessment of salmon escapement as needed for fishery management (Menard 1998a). A fixed picket weir design was employed from 1991 to 1997. Use of a counting tower preceded the weir from 1981 through 1990 (Burkey 1990). The weir and tower projects monitored passage of chinook, sockeye and chum salmon. The BEG's are 3,500, 25,000 and 15,000 fish, respectively (Buklis 1993). The size of the entire Goodnews River drainage salmon spawning populations is estimated postseason based on the proportion of fish seen during aerial surveys relative to weir passage (Menard 1998a).

Like most streams, assessment of coho salmon in the Goodnews River is problematic because of the high stream flows that often occur during the coho season. The problem was addressed in 1997 through the aid of the USFWS and BSFA who facilitated the purchase, fabrication and installation of a resistance board weir (Menard 1998a). The resistance board weir replaced the fixed picket weir about mid-summer in 1997 and for the first time salmon enumeration continued through coho season. The resistance board weir replaced the fixed picket weir entirely in 1998 and escapement monitoring continued uninterrupted through 17 September. The late August and September operation was again funded through a grant from the USFWS. The 1998 coho run was stronger and more prolonged than in 1997; passage continued to be strong, but pulsey until the last day the weir was operated. Plans for 1999 include several additional days of operation in order to more fully assess the coho passage.

## ***Salmon Run Strength Assessment***

Salmon managers require timely inseason assessment of salmon run abundance. In the Kuskokwim River, escapement projects provide limited usefulness in this regard because of the great distances between the areas of harvest and the project locations. As a consequence, managers rely on test fisheries, commercial catch statistics, and anecdotal information from subsistence and sport fishers to augment escapement data.

In Kuskokwim Bay the escapement monitoring projects are much closer to the commercial fishing districts, so escapement data can be effectively used for inseason management. Kuskokwim Bay managers also make use of commercial catch statistics and information from subsistence and sport fishers. Catch statistics are especially important in District 4 where reliable escapement monitoring has been lacking.

### **Bethel Test Fishery**

Daily inseason assessment of Kuskokwim River salmon run strength and timing is available from a drift gillnet test fishery operated near Bethel. The Bethel test fishery is located at river mile 80 of the Kuskokwim River which is about the midpoint of District 1 (Figure 2). The project began in 1984 and the methodology has remained largely unchanged (Molyneaux 1998). From early June through late August the test fish crew conducts three or four systematic gillnet drifts beginning one hour after high tide. The drifts are done at three stations distributed across the width of the channel. Each drift is 20 minutes in duration. Two 50 fathom gillnets are used, one net is hung with 5-3/8-inch mesh web and the other with 8-inch mesh. The two gillnets are rotated between the three stations following a systematic schedule. Both mesh sizes are operated from early June through about 10 July when chinook, sockeye and chum salmon all occur in relatively good abundance. The 8-inch mesh is discontinued after about 10 July when chinook abundance is low. Test fishing with the 5-3/8-inch mesh continues until late August.

The test fish catch from each tide is tallied by species then sold to a local fish buyer or distributed to charities. Catch statistics for chinook, sockeye, chum and coho salmon are presented as daily catch-per-unit-effort. Comparisons are made with test fish results from previous years to assess abundance and run timing. The comparisons are subjective in that managers need to consider variables such as water level, fishing patterns and changing river morphology when comparing data from between years, and even within years.

Historically, other test fisheries have been attempted in the Kuskokwim River: Kwegooyuk test fishery, 1966 - 1983 (Baxter 1970, Huttunen 1984b); Eek test fishery, 1988 - 1994 (unpublished); Kuskokwim River subsistence test fishery, 1988 - 1990 (Kuskokwim Fisherman's Cooperative, 1991); Aniak test fishery, 1992 - 1995 (unpublished); Chuathbaluk test fishery, 1992 - 1993 (unpublished); and the Lower Kuskokwim River test fishery, 1995 (unpublished). Most of these projects were initiated at the prompting of groups other than ADF&G. They were all eventually discontinued for a variety of reasons including lack of funding, problems with consistency, difficulties with catch disposition, and ambiguous results.

## **Commercial Catch Statistics**

Comparison of commercial catch statistics is another common method for assessing run strength. However, the usefulness of this approach can be confounded by inconsistencies in the number of participating fishers, the duration of commercial fishing periods and other variables that might influence catch or the effort applied by fishers. The practicality of this approach is limited, in years of low run abundance, because of the consequent fish mortality.

## **Subsistence and Sport Fish Information**

Throughout each season staff keep in close communication with subsistence and sport fishers to assess their fishing success and the degree to which their needs are being met. These catch reports sometimes play a pivotal role in management decisions.

## **Kuskokwim River Sonar**

The department began developing a user-configurable sonar project in 1988 for deployment in the mainstem of the Kuskokwim River near Bethel (Mesiar et al. 1994). That project became operable in 1993, but shortages in technical support and the restructuring of the Regional sonar program precluded its operation after 1995. The Kuskokwim River sonar project is scheduled to resume within the next few years as part of the Regional sonar rebuilding program. Staff conducted site surveys in 1998 and limited development is planned for 1999 at a new site. The project is expected to require three or more years of development before it is able to provide information for inseason management.

## **SEASON SUMMARY**

The 1998 Kuskokwim Area salmon season opened by emergency order with a period in District 4, on 15 June. The salmon season closed by regulation on 8 September following the final fishing period in District 4 on 7 September.

Poor returns of chum and coho salmon, coupled with low prices resulted in the second lowest harvest since 1983 and second lowest exvessel value for Kuskokwim Area salmon fisheries since 1976 (Appendix A.6). Commercial salmon sales in 1998 were 46% below the most recent 10-year average (1988-1997). In 1998, 755,330 salmon were sold in the Kuskokwim Area. The catch was composed of 44,192 chinook, 129,449 sockeye, 311,910 coho, 2,720 pink and 267,059 chum salmon (Table 3). The 1998 estimated salmon harvests compared to the recent 10-year averages were as follows: chinook, 18% below, sockeye, 21% below, coho, 51% below, pink, 88% below<sup>3</sup> and chum 49% below average (Appendix A.4). The commercial harvest of chum was the third lowest since 1985 while the coho harvest was the second lowest since 1983.

---

<sup>3</sup> Even years only.



The department sold 210 chinook, 625 sockeye, 607 coho and 1,140 chum salmon from the Bethel test fishery. These fish were not included in the commercial sales.

In 1998, 707 of the 832 Kuskokwim Area permit holders made at least one landing (Appendix A.6). This was the second lowest number of permit holders fishing in the Kuskokwim Area since 1984 when documentation of this statistic began. Commercial fishing effort, measured by permit-hours, was the second lowest since 1972 and only 62% of the most recent 10-year average (Appendix A.5).

The average prices paid per pound were extremely low (Appendix A.8). Chinook salmon were worth an average of \$0.27 per pound, the second lowest price since 1973 and \$0.34 below the 10-year average. Likewise, sockeye salmon were worth \$0.53 per pound, which was \$0.27 below average and the third lowest price since 1985. The price for coho salmon of \$0.32 per pound was \$0.23 below average and the second lowest since 1975. Pinks brought \$0.10 a pound, \$0.02 below average. The \$0.13 per pound paid for chum salmon was half the average and the third lowest since 1972.

Kuskokwim Area permit holders received \$1,634,495 for their catch, excluding bonuses and other incentives not reported on fish tickets. Salmon buyers and processors operating in the Kuskokwim Area during 1998 are listed in Table 3. The value of the catch was the second lowest since 1976 and 67% below the previous 10-year average of \$4,918,193 (Appendix A.6). The average income per permit holder was \$2,312, the second lowest on record and 62% below the 10-year average of \$6,109.

Permit-hours were well below average in Districts 1 and 2 because of limited fishing time due to weak chum and coho salmon returns and lower fisher participation caused by low prices. Permit-hours were also well below average in District 5, primarily due to low prices. The number of permit-hours in District 4 was 23% below the most recent 10-year (1987-1996) average (Appendix A.5).

### ***Kuskokwim River (Districts 1 and 2)***

The Working Group, comprised of representatives from several Kuskokwim River salmon user groups, continued to work closely with the department in 1998. Through uncommon dedication by all the concerned parties, the Working Group provided inseason management recommendations that served as a cooperative approach to management of the Kuskokwim River salmon fisheries (Table 4). During the season, the Working Group met 22 times to evaluate the status of the salmon runs and make recommendations to the department.

The 1998 preseason outlook was for a below average chum salmon run. The return of five-year-old fish was expected to be below average based on the extremely poor return of four-year-old fish in 1997 and the extremely low escapement into the Aniak River in 1993. The return of four-year-old chum salmon from the 1994 escapement was expected to be average to above average based on good parent-year escapement. Overall, the 1998 commercial harvest of chum salmon was expected to be below average, ranging from 20,000 to 400,000 (Burkey et al 1999).

Between 24 June and 29 August, there were 12 commercial fishing periods (ten 6-hour and two 4-hour) in District 1 for a total fishing time of 68 hours. There were two 6-hour commercial fishing periods in District 2 between 6 August and 11 August (Table 6). Total commercial harvest in Districts 1 and 2 was 17,359 chinook, 60,906 sockeye, 210,481 coho, 92 pink and 207,809 chum salmon (Table 6). Total exvessel value of the catch was \$984,258, only 27% of the previous 10-year average exvessel value (Table 3).

A total of 615 permit holders fished in District 1 while only 3 permit holders participated in the District 2 commercial fishery in 1998. In 1998, the number of permit holders participating in the commercial fishery was below the historical average for that date in all 12 periods and at record low levels in 5 of those periods. These low effort levels confounded comparisons of historical catch and CPUE.

The Bethel test fishery CPUE provides a good estimate of the migration rate of salmon passing Bethel. The midpoints of the chinook, sockeye and coho migrations in the Bethel test fishery were slightly later than normal. The chinook migration midpoint of 25 June was 3 days later than the historical median of 22 June (Appendix B.6). The sockeye migration midpoint was 2 July, 4 days after the 28 June median (Appendix B.9). The midpoint of the coho run was 13 August, 4 days later than the historical median of 9 August (Appendix B.12). Run timing of chum salmon was different than the other three species with the midpoint of the run being 1 July, 2 days earlier than the 3 July median (Appendix B.15).

For nearly the entire months of July and August, Kuskokwim River water levels were above average for the 1984-1998 time period and at record high levels for 26 of the 61 total days. As water levels rose to record levels on 9 July, CPUE for chinook, chum and sockeye salmon dropped significantly and remained at very low levels. These high water levels may have significantly reduced the catchability of salmon in the Bethel test fishery. If true, comparability of CPUE data after 9 July to historical Bethel test fishery data and its usefulness as a run assessment tool would be greatly diminished.

There were six commercial fishing periods in District 1 during the chum salmon season from 24 June to 27 July (Table 6). There were no commercial openings targeting chum salmon in District 2 (Table 6). A total of 207,809 chum salmon were harvested by 592 permit holders (Table 6). This was 46% of the most recent 10-year average chum salmon harvest. The average price per pound for chum salmon was \$0.13 making the exvessel value of the chum catch worth \$183,386 (Table 3).

Run assessment through mid-June showed below average chum and chinook salmon abundance. The Working Group was unable to obtain a quorum at the 19 June meeting. By 22 June, subsistence catches showed increasing chinook and chum salmon run strength. At the 22 June meeting, the Working Group recommended that the Kuskokwim River be opened to commercial fishing on 24 June. The department opened the commercial fishery on 24 June for 6 hours downstream of Bethel in compliance with 5 AAC 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. The catch of 32,467 chum salmon was below average for that date but with the relative low effort level, the CPUE was about average. The chinook catch was also

below average with an average CPUE while the sockeye harvest and CPUE was below average for that date.

For the remainder of the season, run strength indicators generally showed the chum salmon return to be below average. Due to unusually high water levels in the Kuskokwim River drainage, escapement projects, with the exception of the Aniak River sonar, were unable to operate during a significant proportion of the chinook, sockeye and chum salmon migrations. Near complete escapement information was available only for the chum salmon index from the Aniak sonar and the coho escapement at Kogrukluk River weir. The weak return of chum salmon resulted in a conservative management strategy. Commercial periods were separated by an average of almost six days (range 4–10 days) of no fishing to allow time for adequate passage through the fishery. Under what has come to be considered, by most commercial fishers, a 'normal' fishing schedule of two openings per week (Monday and Thursday), there is only two or three days of no fishing between periods.

Chum salmon catches were below the historical average for their respective dates in all but one of the six periods in June and July. However, chum CPUE was average or above average in four of those periods. Chinook salmon incidental catch was generally below historical average while the CPUE was average or above average in all but one period. Incidental catch and CPUE of sockeye salmon was average to above average for all but the first period during the chum directed fishery.

The preseason outlook for coho salmon was for an average to above average return. Coho salmon escapement was considered good during the 1994 parent year. The level of uncertainty in the 1998 coho outlook was especially high given the limited escapement assessment information and the unexpectedly poor return of coho salmon in 1997. The preseason projected harvest of coho salmon in the Kuskokwim River commercial fishery ranged from 500,000 to 700,000 fish (Burkey et al 1999)

The coho salmon season began after the 27 July period when the catch of coho exceeded the chum harvest. The number of permit holders fishing in District 1 was below historical averages while the number of permit holders in District 2 was about one-tenth historical levels due to the lack of a buyer in the District. A total of 210,481 coho salmon were harvested by 583 permit holders (Table 6). This was 38% of the most recent 10-year average coho salmon harvest. The average price per pound for coho salmon was \$0.33 making the exvessel value of the coho salmon catch worth \$516,552.

There were six commercial fishing periods in District 1 and two periods in District 2 (Table 6) during the 1998 coho salmon season. Throughout the season, monitoring projects and commercial catch data indicated below average coho salmon run strength. The conservative management strategy followed during the chum directed fishery was continued through the coho fishery. The run was not judged strong enough to support the 'normal' coho salmon fishing schedule of two periods per week and three periods during the peak passage week. Commercial periods were separated by four to six days of no fishing to allow for adequate passage of coho salmon through the fishery. Coho salmon catch and CPUE were below the historical average for that time period for all six commercial fishing periods in August with the final period having

record low catch and CPUE. During the management of coho salmon, the Working Group agreed with the department's recommendation to fish for 6 hours for all periods. The Kuskokwim River closed to commercial fishing per regulation on 1 September after the last period on 29 August.

On 3 August, the Working Group recommended a 6-hour commercial opening in District 1 on 6 August. After receiving confirmation that a processor would purchase fish from District 2, the department included District 2 in the 6 August period. Only three permit holders fished in District 2 during the opening due to the need to travel over 60 miles to District 1 to deliver their catch. The Working Group recommended opening Districts 1 and 2 on 11 August but no fishers participated in the District 2 fishery. Since 1996, subsistence fishers in District 2 communities have shown increasing opposition to commercial fishing in the district as effort levels have decreased. The number of permit holders fishing in District 2 has dropped from 15-20 per period before 1996 to less than 5 per period since 1996. There were no more commercial fishing periods in District 2 after 11 August.

### **Chinook Salmon**

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish from 1960-1969 to 115,000 during 1988-1997 (Appendix B.2). A conservation concern for Kuskokwim River chinook salmon arose following a series of years with poor chinook salmon escapements in the mid-1980s (Figure 6). Besides the poor escapements, the low number of female chinook salmon in the escapement compounded the conservation concern (Cappiello and Burkey 1997).

Beginning in 1984, the Board of Fisheries began restricting the commercial fishery because the department was unable to correct the problem through inseason management measures. In 1985, a shift to 6-inch or smaller mesh commercial gillnets reduced the harvest of larger female chinook salmon. This gear change was successful in reducing the sex ratio of the commercial catch from 43% to 29% female (Molyneaux and DuBois 1996). However, the total escapement index continued to decline (Figure 6). To provide for the subsistence harvest and maintain average spawning escapements the directed commercial harvest of chinook salmon was prohibited in 1987. Chinook salmon escapements improved in subsequent years (Figure 6). An unexpected benefit of the improved status of chinook salmon in the Kuskokwim River was an increase in the commercial harvest of chinook salmon (Molyneaux and DuBois 1996). The subsistence fishery continues to target large chinook salmon with "king" gear. Improved survival, perhaps related to elimination of the directed high seas salmon fishery, played a role in the success of these management changes.

Since 1987 the chinook salmon catch has been incidental to the chum salmon fishery in Districts 1 and 2. In 1998 the commercial harvest of 17,359 was well below the recent 10-year average of 31,099 (Appendix B.2). This was primarily due to the limited fishing time during the chum salmon fishery. The exvessel value of the chinook harvest was \$74,396, well below the recent average of \$318,914 (Table 3).



Even with a relatively late start of the commercial fishery and fewer openings, the total Kuskokwim River drainage escapement index for chinook salmon was not achieved in 1998 (Figure 6). Due to high water, the Kogruklu River weir did not operate for a long enough portion of the chinook migration to allow for an accurate estimate of total passage. However, daily passage counts during the last 25% of the run were generally similar to historical average daily counts for those years where the escapement goal was achieved (Appendix B.28). Chinook salmon escapement goals were achieved in only 1 of the 6 aerial survey index streams that were surveyed (Appendix B.3 and Table 7). The Bethel test fish index for chinook salmon ranked tenth out of 15 years, suggesting below average run strength (Appendix B.4).

### **Sockeye Salmon**

The sockeye salmon catch is incidental to the directed chum salmon fishery in Districts 1 and 2. Before 1981, sockeye and chum salmon were not accurately differentiated in commercial or subsistence catches. This prevented an accurate record of the sockeye and chum salmon harvest in the Kuskokwim River. Sockeye salmon have comprised 5% to 33% of the sockeye-chum salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2% of the sockeye-chum salmon catch (Appendix B.16). In 1998 the commercial harvest of 60,906 sockeye salmon was only 6% below the recent 10-year average of 64,551 (Appendix B.16). This was a good harvest considering the limited fishing time during the chum salmon fishery.

Sockeye salmon escapement is documented ancillary to the other species. Due to high water levels, the Kogruklu weir did not operate for a long enough portion of the sockeye migration to allow for an accurate estimate of total passage. However, daily passage counts during the last 30% of the run were generally at or above historical average counts for those days (Appendix B.29). The Bethel test fish index for sockeye salmon ranked eight of 15 years of data (Appendix B.8).

### **Chum Salmon**

Before 1971, chum salmon were an incidental catch during the chinook and coho directed salmon fisheries. The expansion of the commercial chum salmon fishery began in 1971. Based on the 1924-1943 subsistence harvest estimates, a total chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run (Appendix A.4). A combined commercial and subsistence catch of 400,000 chum salmon was the management goal from 1971 to 1979. Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Appendix B.17). From 1971 to 1980 the average subsistence chum harvest was 173,689. The average harvest declined to 136,206 for the period 1981 to 1990 (Appendix B.17). This is thought to be primarily due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 451,316 salmon in the last 10 years (Appendix B.16).

The following guidelines are used to manage the commercial harvest:

1. Chum salmon run assessment projects indicate that escapements will be adequate.
2. Commercial catch per unit of effort compares to previous years when escapements were adequate.
3. Subsistence fishers report adequate subsistence catches.

Declining run strength normally resulted in a one to two week closure beginning in the last half of July. Since 1988, this closure of the commercial fishery between the chum and coho seasons has not occurred in most years. Before 1985, only that portion of District 1 downstream of Bethel was open to commercial fishing during the chum salmon fishery. The Board instructed the department to use the entire length of District 1 beginning in 1985. Low chum escapements occurred in 1986 and 1987. Runs in 1988 and 1989 were at record high levels, but in order to reach escapement objectives more time was required between fishing periods. The 1990 and 1991 runs were smaller but a 4 to 6 day spacing between periods resulted in approaching or reaching chum salmon escapement objectives. Since 1991, the commercial fishery has tended to open later in June and generally have relatively longer spacing between commercial periods. The 1993 and 1997 returns were two of the lowest on record having only one commercial opening and the lowest subsistence harvests on record. The returns in 1994 and 1996 were strong but limited processing capacity resulted in below average commercial harvests (Appendix B.18).

The cumulative CPUE for chum salmon in the Bethel test fishery in 1998 was the fourth lowest since the project began in 1984 (Appendix B.14). The minimum escapement objective for the Aniak River sonar was met (Table 8). Due to high water levels, the Kogrukluk weir did not operate for a long enough portion of the chum migration to allow for an accurate estimate of total passage. However, daily passage counts during the last 35% of the run were generally at or above historical average counts for those days (Appendix B.30). Daily chum salmon counts at the George River weir were generally better than corresponding counts in 1997 but below counts in 1996 (Appendix A.7).

At the Kogrukluk River weir, parent-year escapements exceeded the objective in the 1993 and 1994 brood years. Escapement past the Aniak River sonar was well below objective in 1993 while the objective was achieved in 1994. The observed contribution of 5-year-old chum salmon was lower, as expected based on the number of 4-year-olds in 1997. The contribution of 4-year-old fish in the 1998 return was strong, as expected based on the good escapement in 1994.

### **Coho Salmon**

Kuskokwim River managers have a limited number of inseason indicators of coho salmon abundance in the drainage: the Bethel test fishery, Kogrukluk River weir, commercial catch data and an informal collection of subsistence information. The Kogrukluk River weir has a coho escapement objective of 25,000 fish. Commercial catch per unit of effort in District 2 during

coho season is used as an indicator of abundance of coho salmon above District 1. The CPUE in District 2 has been useful when weir data are unavailable (Figure 7).

Traditionally, coho salmon (locally called "rain fish") were not well utilized for subsistence because of poor drying conditions during rainy fall weather. Subsistence use of coho salmon has increased in areas where freezers are available to preserve fish. Since 1998, Subsistence Division staff has started their surveys after coho salmon have completed migration past the upper river villages. This has improved the quality of the coho salmon data over earlier years when subsistence surveys were conducted before subsistence fishing for coho was finished.

Commercial coho fishery management in the Kuskokwim River is based on coho salmon abundance when that species dominates the commercial catch. Fishing periods are usually simultaneous in Districts 1 and 2 throughout the season, which closes by regulation on 1 September. Record runs in 1984 and 1994 as well as a late run in 1989 resulted in extensions of the season in those years (Appendix B.18). The management strategy during the coho season is similar to that for chum salmon.

In the most recent 20 years, coho catches have ranged from 196,000 fish in 1983 to the record high harvest in 1996 of 937,299 fish (Appendix B.16). The most recent 10-year average harvest is 545,658 fish. Since 1985, in years when both Districts 1 and 2 had buyers, the number of permit holders that fished during coho season has ranged from 597 to 775. In 1998 a total of 583 permit holders harvested 210,481 coho salmon in the Kuskokwim River districts (Table 6).

Under cooperative management of the commercial fishery with the Kuskokwim River Salmon Management Working Group, the coho salmon escapement goal at the Kogrukluk River weir has been achieved in three out of seven years with adequate data (Appendix A.7). Distrust by the public of the Bethel test fishery, lag time of Kogrukluk River weir escapements, and lack of sufficient additional data contributed to the over fishing. The department's uncertainty during the early portions of the run often caused corrective actions to come too late to make a significant difference in escapement needs to the upper drainage as indexed by Kogrukluk River weir. The escapement objective at Kogrukluk River weir was achieved for three consecutive years from 1994-1996.

In 1998, the Kogrukluk River weir operated for almost the entire coho migration period. An estimated 24,344 coho salmon escaped, only 3% below the minimum escapement goal of 25,000 fish (Appendix A.7). The Bethel test fishery cumulative CPUE in 1998 was the lowest on record (Appendix B.10).

In the last decade, when buyers have been present in District 2, commercial fishing in July and August has usually been simultaneous with District 1 (Appendix B.19). Before 1997, the commercial fishing effort in District 2 had been fairly consistent and had provided a CPUE that correlated well with escapement at the Kogrukluk River weir. An average cumulative CPUE of 43 or greater for fishing periods between 1 and 21 August has resulted in the escapement goal being reached (Figure 7). The 1996 cumulative CPUE was 58, reflecting the record escapement passed the Kogrukluk River weir. Since 1997, the correlation between District 2 CPUE and Kogrukluk River weir escapement has broken down, probably due to the much lower than

normal participation in the fishery and reduced fishing time. In 1997, the Kogruklu River weir coho escapement was well below that expected based on the District 2 average CPUE of 40 while the escapement in 1998 was higher than expected given the average CPUE of 17 in District 2.

### **Roe Sales**

There were no sales of salmon roe in the Kuskokwim Area in 1998. In response to a sudden increase in roe sales in 1996 (Burkey et al 1998), three proposals to prohibit roe sales in the Kuskokwim Area were submitted to the Board of Fisheries. The Board adopted a regulation prohibiting roe sales in the Kuskokwim River, Districts 1 and 2, at their December 1997 meeting.

### ***Kuskokwim Bay***

#### **Quinhagak (District 4)**

District 4 is located in the marine waters adjacent to the village of Quinhagak at the mouth of the Kanektok River, approximately 25 miles south of the Kuskokwim River (Figure 4). The commercial fishery was initiated in 1960, and occurs only in the marine waters of Kuskokwim Bay to ensure adequate escapement of salmon into the Kanektok and Arolik Rivers. The northern boundary of the fishing district is approximately seven miles from Quinhagak at Weelung Creek, and the southern boundary of the fishing district is approximately four miles from Quinhagak at the southernmost mouth of the Arolik River. The western boundary of the fishing district is three miles from the coast. Commercial fishing occurs primarily in the tidal channels that radiate out into the bay from freshwater streams in the district.

In the Kuskokwim Area, permit holders have unrestricted movement between commercial fishing districts, and the commercial fishing effort in District 4 increased considerably in the early 1990s. The number of permit holders, fishing in District 4, the last two decades has ranged from 177 in 1982 to a record high of 409 during the 1993 season. The recent 10-year average is 321 permit holders (Appendix C.1). The majority of the fishing effort occurs during the chinook and sockeye season with usually twice as many permits fished compared to coho season (Appendix C.2). The shift of effort to District 4 may be due to the directed chinook salmon fishery, and changes in the June Kuskokwim River commercial fishery. However, in the last three years District 4 has had below average effort with 218, 289, and 203 permit holders in 1996, 1997, and 1998, respectively. In 1998, the number of permits fished during chinook and sockeye salmon season were one-third below the 10-year average and the number of permits fished during coho season were one-quarter below the 10-year average (Appendix C.2). The lower number of permit holders participating in the fishery in the last three years may be attributable to lower fish prices. The 1998 District 4 harvest of 192,035 salmon was the eighth highest salmon harvest on record (1960–1998), but was 9% below the recent 10-year average of 210,079 salmon (Appendix C.3). The low prices of the past few years have continued, and the exvessel value of \$465,972 was 45% below the 10-year average of \$845,951 (Table 3).



A joint counting tower project between the department and the Native Village of Kwinhagak (NVK) was hampered by high water levels and unable to count the 1998 salmon escapement. No escapement aerial surveys (Appendix C.4) were flown because of high water levels and poor weather conditions.

District 4 opened on 15 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN, which requires an opening before 16 June. All fishing periods in 1998 were 12 hours. A below average harvest for chinook salmon occurred on the first opener (Table 9 and Appendix C.5). However, the CPUE for chinook salmon was average and commercial fishing continued two times a week until sockeye salmon dominated the catch during the 29 June opening (Table 9). Average CPUE for chinook salmon in the commercial fishery suggested an average run. The 1998 chinook salmon commercial catch of 23,158 was the ninth highest catch on record (1960-1998) and was 15% above the recent 10-year average of 20,163 (Appendix C.3). Buyers paid an average price of \$0.25 per pound, which was a few cents lower than last year's price. The exvessel value of chinook salmon of \$81,566 was well below the 10-year average \$196,049 (Table 3).

The directed sockeye salmon fishery began after the 29 June opening. Fishing occurred only twice during the first week of the sockeye fishery as the catch and CPUE (Table 9) were below the historical average (Appendix C.6). The following week the sockeye CPUE improved to the historical average and fishing continued three times a week until coho salmon dominated the catch during the 31 July opening. The 1998 sockeye salmon catch of 41,382 was the ninth highest catch on record (1960-1998), but was lowest catch in the 1990s, and was 30% below the recent 10-year average of 58,907 fish (Appendix C.3). However, the sockeye CPUE in 1998 was average. The average price paid for sockeye salmon was \$0.56 per pound and was \$0.14 above last year's price. The exvessel value for sockeye salmon in District 4 of \$150,261 was well below the 10-year average of \$290,788 (Table 3).

Chum salmon are an incidental catch in the chinook and sockeye salmon commercial fisheries in District 4. The 1998 chum salmon catch of 45,095 was 18% below the recent 10-year average of 54,936 fish (Appendices C.3 and C.7). The average price per pound for chum salmon was the same as last year (\$0.11), and the exvessel value of \$35,254 was well below the 10-year average of \$88,363 (Table 3).

The directed coho salmon fishery began after the 31 July opening in which coho salmon catch surpassed sockeye salmon catch. Commercial catches, when compared with the historical catches, indicated an above average coho salmon run (Appendix C.8). Fishing continued with three periods per week throughout the coho season. Only one fishing period, on 19 August, was missed because of inclement weather. The last commercial fishing period was on 7 September, and the commercial fishery closed by regulation on 8 September. The 1998 coho salmon catch of 80,183 was the fifth highest on record (1960-1998), and 28% above the recent 10-year average of 62,663 fish (Appendix C.3). Permit holders were paid an average of \$0.30 per pound, which was \$0.04 below last year's price. The exvessel value of \$198,041 was below the 10-year average of \$266,617 for coho salmon (Table 3).

## Goodnews Bay (District 5)

Commercial fishing began in Goodnews Bay, the southernmost salmon district in the Kuskokwim Area, in 1968 (Figure 5). Fishing is primarily with drift gillnets in tidal channels in Goodnews Bay and a few set gillnets near the mouth of the bay. The number of commercial fishers peaked in 1988 when 125 permit holders fished, and the recent 10-year average is 93 permit holders (Appendix D.1). However, in the last three years participation has been below average in District 5, with 53, 54, and 50 permit holders in 1996, 1997, and 1998, respectively (Appendix D.2). The lower number of permit holders participating in the fishery in the last three years may be attributable to lower fish prices. The 1998 District 5 harvest of 66,648 salmon was 24% below the recent 10-year average of 87,611 salmon (Appendix D.3). The exvessel value of \$184,264 was 55% below the 10-year average of \$407,878 (Table 3).

A counting tower on the Middle Fork Goodnews River provided estimates of salmon escapement from 1981 through 1990. In 1991 a weir replaced the tower. This provided more accurate counts at a lower cost, and the savings have allowed the project to enumerate a portion of the coho salmon escapement. The primary objective of this project is to provide daily escapement information to improve management of the commercial fishery. The Middle Fork Goodnews River weir project also provides a calibration of aerial survey accuracy (Appendices D.4 and D.5).

As in District 4, all fishing openings in District 5 in 1998 were 12 hours long. District 5 opened to commercial fishing on 30 June (Table 10). Over the last five years the management strategy has been to delay the first opening until the last week of June as an attempt to increase escapement of chinook salmon into the Goodnews River drainage. This strategy has resulted in the escapement goal of 3,500 chinook salmon, past the Middle Fork Goodnews River weir, being met three times in the last five years. In 1998, the escapement of 4,584 chinook salmon was 31% above the goal. An aerial survey of the north (main) fork and middle fork of the Goodnews River enabled north fork escapement to be estimated at 3,797 chinook salmon (Appendix D.4). The commercial catch of 3,675 chinook salmon was the highest catch in ten years, and 38% above the recent 10-year harvest of 2,670 fish (Appendix D.3 and D.6). Permit holders were paid an average of \$0.25 per pound, which was \$0.09 less than last year's price. The exvessel value of \$13,685 was below the 10-year average of \$30,881 for chinook salmon (Table 3).

Fishing occurred only twice during the first week of the fishery as the sockeye catch and CPUE (Table 10) were below the historical average (Appendix D.8). The following week of the sockeye directed fishery the CPUE improved to the historical average and fishing was increased to three times a week and continued until coho salmon dominated the catch during the 3 August opening. The commercial harvest in 1998 was 27,161 sockeye salmon, which was 32% below the recent 10-year average of 39,882 fish. The average price paid for sockeye salmon was \$0.54 per pound, which was \$0.12 above last year's price. The exvessel value for sockeye salmon in District 5 of \$100,171 was below the 10-year average of \$223,471 (Table 3). The escapement at the Middle Fork Goodnews River weir was 47,951 sockeye salmon, exceeding the goal of 25,000 fish. An aerial survey enabled the North Fork Goodnews River escapement to be estimated at 14,693 sockeye salmon (Appendix D.4).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. Chum catches were below historical catches (Appendix D.8). The 1998 catch of 14,155 fish was 37% below the 10-year average of 17,608 fish and ranked ninth historically. The average price per pound for chum salmon was the same as last year (\$0.11), and the exvessel value of \$11,133 was below the 10-year average of \$33,847 (Table 3). The chum salmon escapement at Middle Fork Goodnews River weir of 28,905 fish exceeded the goal of 15,000 fish (Appendix A.7). An aerial survey enabled the North Fork Goodnews River escapement to be estimated at 24,940 chum salmon (Appendix D.4).

The directed coho salmon fishery began after the 3 August opening, when coho salmon catch surpassed sockeye salmon catch. Coho CPUE was average and fishing continued on the three periods per week schedule, except for the third week of August, when fishing was reduced to two periods per week because of limited tender availability. The last period was September 7 and the district closed by regulation on September 8. The 1998 coho salmon catch of 21,246 was the third highest in the 1990s and ranked eleventh historically, but was 10% below the recent 10-year average of 23,588 fish (Appendices D.3 and D.9). Permit holders were paid an average of \$0.30 per pound, which was \$0.04 less than last year. The exvessel value of \$59,102 was below the 10-year average of \$118,547 (Table 3).

This was the second year that coho escapement counting continued into mid-September at the Middle Fork Goodnews weir. The escapement count of 35,441 coho salmon was over triple the escapement count of 1997. Approximately 40% of the coho escapement count in both 1997 and 1998 occurred in September. No BEG has been established due to the limited coho escapement data. Poor flying conditions during late August and September prevented aerial surveys of coho salmon escapement.

### ***Enforcement***

The Fish and Wildlife Protection Division of the Department of Public Safety were present in the Kuskokwim Area from early June until early September. Personnel available for this program were four commissioned and one non-commissioned officer. They used one C-185, three Supercub aircraft and one skiff. Citations were issued for commercial fishing in closed waters, closed season or closed period, no commercial fishing or crewmember license, and failure to properly identify vessels and gear.

### **OUTLOOK FOR 1999**

The Kuskokwim Area has no formal forecast for salmon returns. Broad expectations are developed based on an evaluation of parent-year escapements and trends in harvest and perceived productivity. Harvest expectations are described using a loose interpretation of the statistical quartiles of the past ten years of harvest performance as a general guideline. Readers should be cautioned that these outlooks are subjective and have a high level of uncertainty associated with them.

Many of the major salmon runs of Western Alaska had extremely low returns in 1997 and 1998 for reasons that are not fully understood (ADF&G 1997, NOAA 1999). In the Kuskokwim River, the poor return of age 4 and 5 chum salmon in 1997, and age 5 chum in 1998, were in part an aftereffect of brood year run failures in 1992 and 1993 (Francisco et al. 1993, 1994b). For the 1999 returns, that influence should not be a factor. On a broader scale, however, the Western Alaska run failures of sockeye, chum, chinook and coho salmon likely have some linkage to the short term anomalous ocean conditions in 1997 and 1998; i.e., an exceptionally strong El Niño event in 1997 and La Niña event in 1998 that may have resulted in poor ocean survival of juvenile salmon (Kruse 1998, NOAA 1999). This event may continue to have a negative influence in 1999 for those cohorts of salmon which were ocean resident during the anomalous conditions.

In addition to these shorter-term effects, many researchers (e.g.: Beamish et al. 1997, Mantua et al. 1997, Hare et al. 1999) describe evidence of a long-term shift in the climatic conditions of the North Pacific and Bering Sea that are not favorable to salmon production in Western Alaska. If true, the influence of this climatic 'regime shift' is expected to reduce the overall productivity of Western Alaskan salmon returns into the next decade. These factors make even more difficult the efforts to develop outlooks for the upcoming season.

### ***Chinook Salmon***

Most chinook salmon return to the Kuskokwim Area at age six, five, or four (Molyneaux 1998), so the primary brood years for the 1999 return will be 1993, 1994 and 1995. Commercial fishers throughout the Kuskokwim Area are restricted to using gillnets with mesh sizes of 6 inches or smaller. All returning age classes are susceptible to harvest with this mesh size, although the older-age (larger) chinook are less vulnerable than younger-aged fish. For the Kuskokwim River drainage, 1993-1995 brood year escapement information about chinook salmon is limited to aerial surveys (Burkey and Cappiello 1996a), and Kogrukluk River weir (Burkey 1995, Cappiello and Burkey 1997). Some brood year data is also available from a weir operated on the Tuluksak River from 1991 to 1994 (Harper 1997). In Kuskokwim Bay, chinook brood year escapement data is available from aerial surveys (Burkey and Cappiello 1996a), and a weir operated on the Middle Fork Goodnews River (Menard 1998a).

### **Districts 1 and 2**

The timing of the chinook migration through Districts 1 and 2 of the Kuskokwim River overlaps broadly with the chum salmon migration. Since 1987 the commercial fishery has been directed at the more abundant chum stocks through gear, time and area restrictions. Managers also delay or restrict the commercial chum fishery when concerns about chinook abundance, or subsistence needs, warrant additional conservation measures (e.g., Francisco et al. 1988, 1990 and 1991). The incidental chinook harvest in the commercial fishery is therefore linked to both the abundance of chinook and chum salmon. Market interest in chum salmon is another variable that sometimes drives the incidental chinook harvest (e.g., Burkey et al. 1997a, 1998).



The return of chinook salmon to the Kuskokwim River in 1999 is expected to be near average. Brood year escapements were good in all three parent years (Table 15 and 17). Commercial fishing was minimal in those years either because of chum salmon conservation concerns (Francisco et al. 1994b, Anderson et al. 1994), or limited market interest in chum salmon (Burkey et al. 1997a). Consequently, chinook escapements were augmented over what would have otherwise been available with more normal fishing effort.

Chinook passage at Kogrukluk River weir and aerial survey results from the brood years suggests escapements were good in those years. Escapement in 1993 was 23 % above the BEG, although aerial survey objectives were only achieved in five of nine streams<sup>4</sup> (Burkey et al. 1997b). In 1994 chinook escapement at Kogrukluk River weir was 52 % above the BEG, and six of eight aerial survey objectives were achieved. In 1995 escapement was twice the BEG, and eight of nine aerial survey objectives were achieved.

Chinook escapement passage estimates are available for Tuluksak River weir from 1991 to 1994, but the project had no BEG's associated with it (Harper 1995a, 1995b, 1995c, 1997, Burkey et al. 1998). The data show a steady increase in chinook escapement over the four years as did the Kogrukluk River weir in those same years.

Throughout the 1990s chinook abundance in the Kuskokwim River has been relatively good. The 1998 return appeared less abundant, but the available information is fragmentary due to high water levels that inhibited the operation of escapement projects and poor weather conditions that made conditions for conducting aerial surveys less than desirable.

The outlook for 1999 is for an incidental chinook harvest near the 10-year average, which is lower than one might otherwise expect based solely on the strength of the parent-year escapements. This outlook takes into consideration the anomalous ocean conditions that may have impacted the early marine residency for some of the returning chinook salmon in 1999. Also considered is the fact that a number of the past ten years had reduced commercial exploitation on chinook salmon due to conservation measures directed at chum salmon (1993, Francisco et al. 1994b; 1994, Francisco et al. 1995; 1997, Burkey et al. 1997b; and 1998, unpublished). If markets and fishing effort allow, the 1999 incidental commercial harvest of chinook salmon is expected to be in the range of 10,000 to 40,000 fish (Table 11).

#### **District 4**

District 4 currently has the only directed commercial chinook fishery in the Kuskokwim Area. Chinook run timing overlaps with the migration of sockeye and chum salmon, but the commercial fishery remains targeted on earlier running chinook as long as that species dominates the catch.

---

<sup>4</sup> Aerial survey objectives as used here include official BEG's and the median historic counts for streams surveyed, but which have no BEG.

The only means of assessing brood year escapement for District 4 chinook is from aerial surveys of the Kanektok River. The aerial survey indexes were 7 % below the BEG in 1993 and 48 % above in 1994. Aerial survey information is not available for 1995, but the commercial harvest was above average that year (Appendix C.3). For lack of any better information, the good commercial harvest in 1995 suggests, arguably, that chinook escapement was good.

The harvest trend for chinook salmon in District 4 has been variable in recent years. The 1996 harvest was in the lower end of the historical range, but the 1997 and 1998 harvests were above average (Appendix C.3). The 1998 return did not appear to be influenced by the factors responsible for the chinook run failure in the Yukon River. Another factor that needs to be considered is that the number of permit holders participating in the District 4 fishery have generally been declining from the peak in 1993.

Based on brood year escapements and recent harvest trends, the 1999 return is expected to be near average. Market interest has not been an obstacle in District 4, although fishing opportunities are occasionally missed due to limited tender availability. District 4 processing capacity may be increased in 1999 if plans to base a floating processor in Quinhagak come to fruition. If markets and effort levels remain steady, commercial harvest is expected to be between 15,000 and 30,000 chinook in 1999 (Table 11).

## **District 5**

Chinook stocks have been depressed in District 5 for much of the past two decades. The commercial fishery is directed at sockeye salmon, but the migratory timing of the two species overlap, with chinook running earlier. The first commercial fishing period of each season is generally delayed as a conservation measure to bolster chinook escapements. The chinook run does appear to be responding to the conservation measures. Escapements past the Middle Fork Goodnews River weir have improved throughout the 1990s, but conservation measures will likely continue in 1999 because escapements still tend to come in below the BEG in most years (Appendix A.7).

Brood year escapements for the 1999 return were 29 % below the BEG in 1993, 10 % above in 1994, and 38 % above in 1995. Commercial fishing effort was relatively high during these years, but the chinook harvest levels were near average.

In more recent years the escapement was 16 % below BEG in 1996 and 1997, but 7 % above BEG in 1998. Commercial fishing effort was down by half in all three of these years, but chinook harvest was down only 31 and 13 % in 1996 and 1997, and it was up 57 % above average in 1998. The 1998 return is of particular interest because both escapement and harvest were well above average. The Goodnews chinook run seemed unaffected by the factors which caused the run failure on the Yukon River.

The incidental chinook harvest in District 5 is driven by the level of early season effort allowed in the sockeye fishery. Market interest and tender availability are also sometimes limiting. The chinook return in 1999 is expected to continue to be lower than desired and conservation measures will likely continue. Still, the incidental chinook commercial harvest is expected to be



between 1,000 and 3,000 salmon, which is in the mid-range experienced over the past 10 years (Table 11).

### ***Sockeye Salmon***

Sockeye salmon return primarily at age five in the Kuskokwim Area (Molyneaux and DuBois 1998), so the 1999 returns will come mostly from the 1994 brood year. In the Kuskokwim River, commercial harvest of sockeye is incidental to the directed chum fishery. The only project providing sockeye escapement information in the Kuskokwim River drainage is Kogrukluk River weir (Burkey et al. 1995). In Kuskokwim Bay, both Districts 4 and 5 districts support sockeye directed commercial fisheries and escapement data is available from aerial surveys (Burkey and Cappiello 1996a) and a weir operated on the Middle Fork Goodnews River (Menard 1998a).

### **Districts 1 and 2**

Sockeye salmon migration in the Kuskokwim River commercial fishing districts overlaps with the chum migration. The commercial fishery is directed at the more abundant chum salmon. Sockeye salmon rarely factor into management decisions and monitoring of sockeye escapements is minimal. The incidental sockeye harvest is therefore linked to both the abundance of sockeye, and chum salmon, with management decisions based primarily on the abundance of chum salmon. Market interest in chum salmon is another important variable influencing the incidental sockeye harvest in the river.

Sockeye salmon stocks appear to be in good condition in the Kuskokwim River based on the limited information available. Returns in 1999 are expected to be near average. Commercial fishing was minimal in the parent year due to chum salmon concerns, consequently good sockeye escapements likely occurred throughout the drainage. The Kogrukluk River, which is not considered a significant sockeye producing system, had an above average sockeye escapement in 1994 (Appendix A.7). It is difficult to determine abundance trends in more recent years because of the lack of monitoring, however escapement levels to Kogrukluk River remained high even through 1997 when Bristol Bay experienced significant declines in sockeye returns. Kogrukluk River weir was inoperable during the 1998 sockeye run, but the incidental commercial harvest was near average despite reduced fishing time and a second year of run failures in Bristol Bay. The outlook for 1999 is that Kuskokwim River fishers can probably anticipate a near average return of sockeye salmon. If market interest and fishing effort for chum salmon allow, the potential incidental sockeye harvest is expected to be in the range of 35,000 to 90,000 fish (Table 11).

### **District 4**

The sockeye run to the Kanektok River is relatively protracted with the bulk of the run harvested between mid-June and late July. For most of June, the sockeye harvest is incidental to the

directed chinook salmon fishery. Fishers are restricted to mesh sizes of 6-inch or smaller, so earlier running sockeye salmon are vulnerable to harvest efforts. The commercial fishery switches to sockeye salmon management by late June or early July when sockeye salmon become dominant in the catches. Still, the run timing of the two species overlap broadly and the overall commercial sockeye salmon harvest has some linkage with chinook abundance.

Sockeye salmon returns to District 4 are expected to be good in 1999. The 1994 brood year escapement, as indexed by aerial survey of the Kanektok River, was double the BEG and very near the 10-year average (Appendix A.7). Harvest levels throughout the 1990s have been markedly higher than previous years (Appendix C.3). In contrast to Bristol Bay, the District 4 harvest in 1997 and 1998 continued to be good even though the number of participating fishers declined (Appendix C.1). Part of the effort drop in 1998 is attributed to the availability of other jobs in the Quinhagak area and the relatively low prices, which drew fewer fishers from Kuskokwim River communities to participate in the Kuskokwim Bay fishery. This trend is expected to continue in 1999. Taking into account the likelihood of below average fishing effort, harvest in 1999 is expected to be in the mid-range of the past ten years which is about 40,000 to 70,000 sockeye salmon (Table 11).

## **District 5**

As with District 4, the sockeye run in District 5 is protracted and overlaps with the earlier running chinook migration. The commercial fishery is directed at sockeye salmon, but the onset of that fishery is usually delayed as part of the chinook rebuilding plan. This management approach will continue to impact sockeye harvest in 1999.

District 5 is expected to have a good sockeye return in 1999. The 1994 brood year escapement past the Middle Fork Goodnews River weir was twice the BEG (Appendix A.7). The trend throughout the 1990s has been towards average to above average escapements that have been consistently above the BEG. The actual number of sockeye harvested the past few years has been below average, but the lower catch is due to a sharp decrease in the number of participating fishers which began in 1996 (Appendix D.1). The catch per unit of commercial fishing effort has actually been good, which again contrasts the situation in Bristol Bay. Still, the lower number of participating fishers does compromise the reliability of using CPUE. As with District 4, part of the effort drop is attributed to the availability of other jobs in the area and the relatively low salmon prices paid to fishers which reduces the attraction of fishers from Kuskokwim River communities. These same factors are expected to limit effort in 1999. The 1999 sockeye harvest from District 5 is expected to be in the mid-range of the past ten years which is around 25,000 to 40,000 fish (Table 28).

## ***Chum Salmon***

Chum salmon return to the Kuskokwim Area primarily at five and four years of age (Molyneaux and DuBois, 1998) so 1994 and 1995 will be the main brood years for the 1999 returns. The Districts 1 and 2 commercial fisheries of the Kuskokwim River target chum salmon. Brood year

escapement information is available mostly from Kogrukluk River weir (Burkey 1995, Cappiello 1998a). Aniak River sonar was operable in 1994, but not in 1995 (Burkey et al. 1996b). Some brood year data is also available from a weir operated on the Tuluksak River from 1991 to 1994 (Harper 1997), and the Takotna River counting tower which was in its first year of operation in 1995.

Chum catches in Districts 4 and 5 of Kuskokwim Bay are incidental to fisheries directed at other salmon species. Brood year escapement information is available from aerial surveys (Burkey and Cappiello 1996a), and a weir operated on the Middle Fork Goodnews River (Menard 1998a).

## **Districts 1 and 2**

Near average numbers of chum salmon are expected to return to the Kuskokwim River in 1999. Spawning escapements for early running stocks are thought to be indexed by Kogrukluk River weir. Parent year escapement at the weir was 54 and 4 % above the BEG in 1994 and 1995 respectively (Appendix A.7). These escapements should provide for a good return of chum salmon during the early portion of the 1999 season.

A significant portion of the Kuskokwim River chum salmon production is attributed to the Aniak River drainage. Aniak River chums are believed to enter the Kuskokwim River a little later than the stocks indexed by Kogrukluk River weir. The sonar passage estimate at Aniak River was 55 percent above the BEG in 1994, but numbers from 1995 are not available (Appendix A.7).

In 1994 the Tuluksak River weir was in its fourth and last year of operation (Harper 1997). The 1994 chum passage was the highest of the four years (Appendix A.7). The escapement pattern seen at Kogrukluk River during those same four years was similar.

Takotna River tower was initiated in 1995. Operations were incomplete in that first year because of a late starting date (Appendix A.7). About half the chum salmon run was thought to have been enumerated, based on the run timing seen in subsequent years of operation. If that supposition is correct, the 1995 passage was greater than any of the subsequent years of operation.

The low returns associated with the poor escapements in 1993 are past, still the influence of the anomalous 1997/98 ocean conditions on marine survival of the 1999 chum salmon return is unknown. The age composition of the 1998 returns offers some optimism. In 1998, age 4 chum salmon appeared to be in fair to good abundance suggesting the age 5 component will have relatively good returns in 1999.

The age composition of the chum salmon return changes as the run progresses. A greater proportion of older age fish return early in the season while the proportion of younger age classes become progressively greater as the season advances. As expected, the proportion of age 3 chum, though small, increased as the 1998 season advanced. Still, the return of age 3 chum salmon was not particularly encouraging of a strong return of age 4 chum in 1999.

Considering all these factors, the 1999 return of chum salmon to the Kuskokwim River is cautiously expected to be near the 10-year average. The harvest is expected to be within the broad mid-range of the past ten years, which extends from about 200,000 to 500,000 fish (Table 11). Limited market conditions and processor interest are additional concerns expected to persist in 1999.

#### **District 4**

Chum harvest in District 4 is incidental to fisheries directed at chinook and sockeye salmon. The run timing overlaps between these species, and management focus is on chinook and sockeye salmon. Chum salmon are not generally integrated into management decisions; their incidental harvest is linked with the abundance of chinook and sockeye salmon.

The District 4 chum salmon escapement is traditionally monitored by aerial surveys of the Kanektok River. Survey counts have been chronically below the BEG index since 1984 (Appendix C.4), but this is probably misleading. The BEG for chum salmon of 30,500 is twice the sockeye BEG of 15,000, but the average aerial count has the reverse ratio of about two sockeye for every one chum salmon. The chum salmon BEG for the Kanektok River is currently under review and will likely be lowered to better reflect historical abundance levels.

The incidental commercial harvest of chum salmon in District 4 has generally been strong throughout the 1990s even though annual effort levels have been decreasing (Appendix C.1). Despite the expectation of continued low effort in 1999, the chum harvest will still likely be in the range of 40,000 to 70,000 fish, which is near average (Table 11).

#### **District 5**

The chum salmon harvest in District 5 is incidental to the sockeye directed commercial fishery. The run timing of the two species overlap, but chum salmon are not generally integrated into the management decision process. The incidental harvest of chum salmon is therefore linked to the amount of fishing effort in the sockeye directed fishery.

Chum salmon escapement in District 5 is monitored at the Middle Fork Goodnews River weir. Escapements in the 1994 and 1995 brood years were the second and third highest on record and more than twice the BEG (Appendix A.7). Throughout the 1990s chum escapements and harvests have generally been good. Harvest levels, however, have declined proportionate to the decline in effort. The return of chum salmon to the district in 1999 is again expected to be good. Considering the expected average sockeye return and continued low effort, the incidental harvest of chum salmon is expected to be between 10,000 and 20,000 fish, which encompasses the mid to lower range of the past ten years (Table 11).

## ***Coho Salmon***

Coho salmon return to the Kuskokwim Area primarily at four years of age, so 1995 will be the main parent year for 1999 returns. There is very little information on which to base the coho run outlooks. For the entire Kuskokwim Area, the only escapement monitoring project operated during the coho season in 1995 was Kogruklu River weir (Cappiello and Burkey 1997). Market interest in coho salmon has been relatively good in the Kuskokwim Area and that trend is expected to continue in 1999.

### **Districts 1 and 2**

The escapement of coho salmon at Kogruklu River weir in 1995 was 11 % above the BEG, still the return from that brood year in 1999 is expected to be below average. Annual coho returns have been volatile the past few years. The trend seen in commercial catch statistics since the early 1980s had been towards increasing annual run sizes with a moderate even year dominance. Returns appeared to peak in 1996 with a commercial harvest of 937,299 coho salmon, plus a record escapement at Kogruklu River weir of 50,555 fish, twice the BEG (Appendix A.7). The trend ended unexpectedly in 1997 when the harvest fell to 130,803 coho and an escapement at Kogruklu River of only 12,312, half the BEG. The return in 1998 was better, but far less than the levels seen in the ten years prior to 1997.

The dramatic decline in coho returns may be linked to the anomalous 1997/98 ocean events. Kruse (1998) and NOAA (1999) describe the anomalous conditions that occurred in the Bering Sea and discuss the likelihood that these events may have negatively impacted survival of juvenile salmon during their marine residency. The marine residency of Kuskokwim River coho salmon that returned in 1997 and 1998 were in the ocean stage of their life cycle concurrent with the warming event. The Bering Sea was still experiencing anomalous conditions in 1998. Coho maturing in 1999 may still be impacted by these abnormal conditions leading to low returns. Considering all these factors, the 1999 coho return to the Kuskokwim River is expected to be average to below average with a harvest in the range of 100,000 to 500,000 fish (Table 11). It should be emphasized that the level of uncertainty in the coho outlook is especially high given recent volatility and limited escapement assessment.

### **Districts 4 and 5**

Commercial harvest data are the primary guide to anticipating coho returns in Districts 4 and 5. As was described for the Kuskokwim River, the trend in District 4 over the past several years had been towards increasing harvest coupled with a modest cycle of even year dominance (Appendix C.3). The District 4 harvest also exhibited a pattern of volatility in 1996 and 1997 similar to what occurred in the Kuskokwim River, but catches in 1998 returned to an above average level. The 1999 return is cautiously expected to be near average with a harvest in the range of 40,000 to 80,000 (Table 11).

Like District 4, coho harvests in District 5 demonstrate modest even year dominance and harvest numbers have been volatile in recent years. The second lowest harvest on record occurred in



1997, but the harvest in 1998 returned to a near average level (Appendix D.3). The Middle Fork Goodnews River weir has been operated though most of the coho seasons for the past two years, showing a 3-fold increase in coho passage from 1997 to 1998. Commercial fishing effort has been down by nearly half for the past three years and is expected to continue to be low in 1999. Assuming below average effort, the outlook for 1999 is for a near average harvest in the range of 15,000 to 30,000 coho (Table 11).

## **SUBSISTENCE SALMON FISHERY**

### ***Background***

The harvest of fish and wildlife for subsistence use is an important component of the mixed subsistence-cash economy throughout the Kuskokwim Area. The subsistence salmon fishery in the region is one of the largest and most important in the state. During summer, early June through August, the day-to-day activities of many Kuskokwim Area households revolve around the harvesting, processing, and preserving of salmon for subsistence use. The seasonal movement of families from permanent winter communities to summer fishcamps situated along rivers and sloughs, continues to be a significant element of the annual subsistence harvest effort. Division of Subsistence studies in the region indicate that fish contribute as much as 85 % of the total pounds of fish and wildlife harvested in a community annually, and salmon as much as 53 % of the total annual harvest (Coffing 1991).

Approximately 1,500 households in the region annually harvest salmon for subsistence use. Many other households, which are not directly involved in catching salmon, participate by assisting family and friends with cutting, drying, smoking, and associated preservation activities (salting, canning and freezing). Annual subsistence harvest surveys have been aimed at gathering data on chinook, chum, sockeye, and coho salmon. Subsistence catches of chinook salmon in the Kuskokwim Area often exceed the commercial catch of this species (Appendix A.4).

There are 37 communities consisting of approximately 3,500 households within the Kuskokwim Area (Figure 1). The majority of the area households (2,765) are situated within the drainage of the Kuskokwim River. Bethel is the largest community in the region, containing approximately 1,322 households. Approximately 190 households are located in the northern Kuskokwim Bay communities of Kwigillingok, Kongiganak and Kipnuk. Residents of these three communities harvest subsistence salmon from the Kuskokwim River as well as from areas closer to the communities. Residents of Quinhagak, Goodnews Bay, and Platinum, located along the south shore of Kuskokwim Bay, harvest salmon stocks primarily from the Kanektok, Arolik, and Goodnews River systems. Residents of Mekoryuk, Toksook Bay, Nightmute, Tununak, Newtok, and Chefnak, situated near the Bering Sea Coast also harvest salmon from coastal waters as well as local tributaries.

## **Eligibility, Licenses, Permits, and Gear**

Eligibility criteria require individuals be Alaskan residents for the proceeding 12 consecutive months before harvesting salmon for subsistence use. Prior to 1990 there were additional restrictions on participation in the fishery. These are described in earlier annual management reports. The majority of those individuals subsistence fishing for salmon in the Kuskokwim Area are residents of the area. People living in other parts of the state who have family or friends in the region sometimes return to the Kuskokwim area to harvest or help process salmon.

During 1998, licenses and permits were not required for subsistence salmon fishing in the Kuskokwim Area. There were no restrictions on the number of salmon that could be harvested by individual fishers or households. Salmon harvested for subsistence use could be caught using set and drift gillnets, beach seines, and fish wheels. In the Holitna, Kanektok, Arolik, and Goodnews river drainages, spears could also be used. The total length of set or drift gillnets in use by an individual fisher could not exceed 50 fathoms. Unless changed by emergency order, gillnets used for harvesting salmon in the Kuskokwim Area could be of any size mesh. Gillnets with 6-inch or smaller mesh could not be more than 45 meshes in depth and nets with greater than 6-inch mesh could not be more than 35 meshes in depth. Fishers were required to have their name and address attached to their gillnets and fish wheels.

## **Inseason Subsistence Closures**

Areas within the commercial salmon fishing districts were periodically closed to subsistence salmon fishing 16 hours before, during, and 6 hours after commercial salmon fishing periods. The purpose of these closures is to discourage illegal commercial fishing and to help discourage the sale of subsistence caught salmon in the commercial fishery. Many of the commercial fishers are local residents who also participate in the subsistence fishery. The specific area closed to subsistence fishing varies from one district to the next. Except for that area between District 1 and District 2, areas outside of the commercial fishing districts did not close to subsistence fishing.

The entire Kanektok and Arolik Rivers in District 4 and all of the Goodnews River in District 5 were closed to all subsistence fishing with nets 16 hours before, during and 6 hours after each commercial fishing period in those districts. Except for District 2 where all tributaries also closed to subsistence salmon fishing, the tributaries in other districts remained open. That portion of the Kuskokwim River between Districts 1 and 2 was closed to subsistence fishing at the same time subsistence closures occurred in District 1. Kuskokuak Slough, located in District 1, did not close to subsistence fishing after 31 July.

## **SUBSISTENCE SALMON HARVEST SURVEYS**

The management of Kuskokwim Area salmon fisheries requires that the Department know how many salmon are harvested in both the subsistence and commercial fisheries. Data on the subsistence harvest of salmon are collected annually. Commercial Fisheries Division began

conducting subsistence salmon harvest surveys along the Kuskokwim River in 1960. Surveys were initiated in Quinhagak (1967) and Goodnews Bay and Platinum (1979). The Division of Subsistence took over the annual subsistence salmon harvest surveys in 1988 under a reimbursable service agreement and have been responsible for collecting and analyzing the data since then.

### ***Methods***

Four methods were used to gather subsistence salmon harvest data. These methods were:

- 1) subsistence salmon catch calendars,
- 2) postseason community household surveys,
- 3) postcard surveys,
- 4) telephone surveys.

The Division maintains a community household database and updates this database annually during the community surveys. Each household in the database is designated as either "usually fish" or "does not usually fish" depending on past fishing history. Households listed in the database were the basis of sampling and estimation of subsistence salmon harvests for the Kuskokwim Area. Each household on the list was assigned a unique identifier through which subsequent information could be tracked.

The goals of the postseason survey were to:

- 1) collect harvest data that would result in a total harvest estimate for subsistence salmon by species for the Kuskokwim Fisheries Management Area by community;
- 2) compile information on fishing effort, gear types, participation rates, and timing of the subsistence harvest;
- 3) update community household lists and identify fishing households;
- 4) determine if subsistence fishing success during 1998 was poor, average, or better than average and, if poor, why.

### **Catch Calendars**

In May 1998, subsistence salmon catch calendars were mailed to all Kuskokwim Area households that had been identified as "usually fish." Three similar, but unique, catch calendars (Appendix S.1) were designed for recording the daily catch of each salmon species harvested for subsistence use. One style of calendar was sent to households in communities along the Lower

and Middle regions of the Kuskokwim River, to communities along the Bering Sea coast and along North Kuskokwim Bay, and to those communities in the Upper Kuskokwim River region upstream as far as the community of Stony River. A second style of calendar was sent to the remaining households in the Upper Kuskokwim River region and a third style was sent to households in Quinhagak, Goodnews Bay, and Platinum. Differences in the style of calendar sent to households take into account the species available, salmon run-timing, and timing of subsistence fishing activities. Where addresses were available, the calendars were mailed to post office boxes; otherwise calendars were sent general delivery for the post office clerk to distribute. Each calendar was postage paid and addressed for return to the Division of Subsistence office in Bethel. Subsistence salmon catch calendars were distributed to 1,663 households.

### **Household Surveys**

The second method of collecting subsistence salmon harvest information was the postseason household surveys. With this method, staff traveled to communities in the Kuskokwim Area and went house-to-house interviewing residents about their 1998 salmon fishing efforts. Similar to the approach used in developing the catch calendars, three color-coded survey instruments were developed and used (Appendix S.2). Except for local terms used for the salmon species, the survey questions asked in each region were identical.

During 1998, the Division of Subsistence staff conducted house-to-house surveys in 24 communities. Budget constraints have precluded attempts to conduct house-to-house surveys in Bethel, where there are over 1,300 households, and in Mekoryuk, Newtok, Nightmute, Toksook Bay, Tununak, Chefnak, and Telida. The villages of Kwigillingok, Kipnuk, and Kasigluk have not allowed household harvest surveys to be conducted for several years. Household surveys are usually conducted in Stony River and Platinum, however, during the 1998 survey period, weather prevented staff from traveling to these communities. McGrath and Bethel are surveyed primarily by telephone and postcard surveys rather than house-to-house surveys.

Survey efforts in these communities occurred over a two-month period beginning in early October, after most residents had completed salmon fishing for the season and after most hunters had returned home from fall moose and caribou hunting. Communities in which residents usually harvest salmon through October were surveyed in November. Time spent in any one community ranged from one-half to two days depending on the size of the community.

Survey work was conducted systematically. Prior to beginning the community surveys, efforts were made to inform and prepare residents for the arrival of staff doing the surveys. This was done weeks or days in advance of their arrival through letters to City, Tribal, or Traditional Council offices in each community, radio announcements, posters in public buildings and phone calls to community officials. Prior to traveling to each community, staff identified households that had already mailed in or returned their salmon harvest calendars.

Upon arrival in a community, staff checked in with the City or Council office to introduce themselves and outline their task. Staff used community household checklists, prepared in

advance, to help them identify households they needed to contact while conducting household surveys. Each "checklist" contained a listing of all known households in the community, identified those households which were reported to have subsistence fished for salmon the previous year (1997), and households which were mailed 1998 catch calendars. Knowledgeable individuals in the community helped staff update the community household list and identify which households "usually fished" and which households "usually did not fish." These individuals also helped to identify households that subsistence fished for salmon in 1998.

Staff attempted to contact all households that were either identified as "usually fish" or were known to have fished during 1998. Structured interviews were conducted with these households through the use of the survey instrument. Subsistence salmon catch calendars that had not been mailed back to the department were also collected. If time permitted, other households on the community list were contacted about their salmon fishing activities. In 1998, 1,079 households were surveyed using this method.

### **Postcard Surveys**

The third method of collecting information on subsistence harvest of salmon was through the use of postcard surveys (Appendix S.3). The postcard survey simply asked if the household harvested salmon from the Kuskokwim Area for subsistence use, the species and quantities harvested, the type of fishing gear used, and how fishing was for each of the four salmon species usually harvested. The postcard could be separated in half and returned postage paid to the department. This type of survey was the primary method of obtaining harvest data from identified "usually fish" households in Bethel, McGrath, Kipnuk, Kwigillingok, Kasigluk, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak and households in other communities which were not available at the time of the community surveys. In Chefornak, postcard surveys were mailed to holders of PO boxes.

Postcard surveys were mailed out to Bethel and McGrath households in late September. Households in these two communities that had not returned their catch calendar or postcard survey were contacted by telephone in November. If a household did not have a telephone, a second postcard was sent to it in November. Several Bethel households were not surveyed because neither their telephone number nor mailing address was known. Overall, approximately 1,300 households were mailed postcard surveys.

### **Telephone Surveys**

The fourth method of collecting information on subsistence harvest of salmon was through telephone surveys. These surveys were conducted in Bethel and McGrath and followed the questioning format of house to house surveys. One Telida household was also surveyed in this manner. Approximately 450 households were surveyed using this method.



## Subsistence Salmon Harvest Estimation

Information from the four information sources (catch calendars, household surveys, postcard, and telephone surveys) was entered into a computer database. Data were verified against source documents, and several logic checks of the data were made. The master list of names and addresses of resident households was updated to reflect changes in household composition and number of households residing in each community. The unique household numbering system was maintained on the master list and on the database tables containing information from each of the four information sources.

In order to provide a single best estimate for a household's harvest of a salmon species during 1998, information was compiled from the various information sources. This process was conducted by a single researcher on the project to ensure data consistency. In most cases, there were few discrepancies between the information available from the different sources. In those cases where a household was determined to have fished for salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing."

Guidelines developed during the course of the process to composite harvest information included the assumptions that:

- (1) the salmon catch calendar contained the best means of recording the household's harvest;
- (2) information from the different sources needed to be evaluated concurrently in order to identify the harvest for each species;
- (3) information from the different sources for a particular species may be different due to the timing of the collection of this information;
- (4) information on the use of salmon to feed dogs is used as a minimum estimate of the household's harvest if no other information was available.

Salmon harvests identified as "removed from the commercial catch for subsistence use" were included in the household's subsistence harvest.

The average community catch ( $C_k$ ) was estimated for salmon species from the composite catch per household data using the following formula:

$$C_k = \sum_{i=0}^1 (N_{ki} * C_{ki}) / \sum_{i=0}^1 N_{ki}$$

where

$k$  = community

$i$  = indicates whether the group "usually fishes" (1) or "usually does not fish" (0)

$N_{ki}$  = number of households that "usually fish" or "usually do not fish"

$C_{ki}$  = mean harvest for households that "usually fish" or "usually do not fish"

The total community catch ( $T_k$ ) was estimated by  $T_k = \sum_{i=0}^1 (N_{ki} * C_{ki})$  and its variance ( $V_k$ ) includes a finite population correction factor:

$$V_k = \sum_{i=0}^1 ((N_{ki}^2)(1-(n_{ki}/N_{ki}))(\Sigma_{ki}^2/n_{ki}))$$

where  $n_{ki}$  = number of households for which information is available that "usually fish" or "usually do not fish" and  $\Sigma_{ki}^2$  = variance for the amount harvested for the "usually fish" or "usually do not fish" households.

If fewer than 30 households or less than 50% of all households in a community were contacted, the reported harvest was used for the estimated harvest. Community catch estimates and their variances were summed across communities for region subtotals and across all regions for Kuskokwim Management Area totals.

### ***1998 Sampling Summary***

A summary of the sampling information by community and fishing area is presented in Table 12. Of the estimated 3,495 households located in the Kuskokwim Area, information was obtained for 2,159 (62%).

A total of 1,621 households have been classified as "usually fish." In 1998, subsistence salmon harvest information was collected from 1,209 (74%) of these households. Households classified as "usually do not fish" for salmon totaled 1,874. Information was collected from 640 (34%) of these households. Many (49%) of the households classified as "usually do not fish" resided in Bethel.

Fishing activity information was obtained for 1,940 households within the Kuskokwim River drainage, including the North Kuskokwim Bay communities. A total of 1,665 of these households were successfully contacted. 1,282 of these households harvested salmon for subsistence use during 1998.

In the South Kuskokwim Bay region, containing the communities of Quinhagak, Goodnews Bay, and Platinum, 159 (76%) of the 209 households living in the region were contacted. Of these contacted households, 131 (82%) fished for subsistence salmon in 1998.

A total of, 301 households have been identified in the Bering Sea coast communities of Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak. A complete list of households was not available for Cheforak, thus the estimated number of households there was not known at the time of the surveys. Because house-to-house surveys were not conducted in these communities, data were obtained only by postcard surveys and calendar returns. Twenty-eight households in this region provided information and twenty-six reported harvesting salmon. Based on data gathered in other years, actual participation in salmon harvesting activities by households in this region is thought to be much greater than that reported by catch calendars or postcard surveys.

House-to-house surveys continue to be the primary vehicle for gathering data on harvest and use of subsistence salmon. Except for Bethel and McGrath where postcard surveys and telephone interviews were the primary data collection method, house-to-house surveys accounted for 54 % of all households contacted.

A total of, 15% (251) of the 1,663 subsistence salmon calendars which were mailed preseason were used and returned. There were 190 responses to the 1,269 postcard surveys that were mailed to Kuskokwim Area households who had not returned harvest calendars and were not interviewed by staff.

### ***1998 Harvest Summary***

A summary of the subsistence salmon harvest estimates by community and fishing area is presented in Table 13. The 1998 total subsistence salmon harvest estimates for the Kuskokwim Area was 86,115 chinook, 67,665 chum, 37,578 sockeye, and 27,239 Coho salmon. Seventy-three percent of the overall subsistence salmon harvests in the Kuskokwim Area were taken by residents of communities located from Tuluksak downstream to Eek (District 1). Correspondingly, approximately 70 % of the area population also reside in District 1.

Chinook salmon are particularly sought after for subsistence use in the Kuskokwim Area and account for a large percentage of the total subsistence catch. During 1998, the subsistence chinook harvest in the region was about average compared to the previous 10-year harvests (Appendix A.10).

Sockeye harvests were slightly lower in 1998 than the previous year. However, the 1998 harvest was greater than the average catch for the previous 10-year period (Appendix A.11). The subsistence coho harvest during 1998 was the lowest on record since 1987 (Appendix A.12). Harvests of coho salmon in the Kuskokwim Area have averaged about 43,000 fish over the past ten years.

Chum salmon harvests during 1998 were 65 % greater than the 1997 harvest (the 1997 harvest was the lowest on record). Although chum harvests increased in 1998, catches were still about 29,000 fish below the previous 10-year average (Appendix A.13).

Several hundred households provided information on the types of gear that they used for harvesting subsistence salmon. It was not unusual for households to use more than one gear type. Drift gillnets were the gear type most commonly reported, particularly in the lower and middle Kuskokwim River areas (Table 14). Set gillnets were used throughout the region. Fishers in the Kuskokwim River drainage from Stony River upstream to Nikolai depended largely on set gillnets for harvesting subsistence salmon. Fish wheels were reported only in the middle and upper Kuskokwim areas where a total of 9 households reported operating a fish wheel. No households reported using either a seine or a spear for harvesting salmon, however several households throughout the region reported using rod and reel gear for taking subsistence salmon. In Nikolai, 50 % of the subsistence fishing households reported catching salmon on rod and reel gear.

Commercial fishers sometimes keep salmon caught during a commercial fishing period and take them home for subsistence use. During 1998, approximately 20 % of the households which reported commercial fishing also reported that they kept salmon from their commercial catch for subsistence use (Table 15). A total of 504 chinook salmon, 420 chum, 307 sockeye, and 611 coho salmon were reportedly retained from the commercial catch for subsistence use. Generally, the number of salmon retained from commercial fishing activities is relatively low.

More than 900 households responded to a question about the quality of subsistence salmon fishing during 1998. The purpose of this question was to learn how households viewed their 1998 subsistence fishing success. Households were asked to rate their subsistence fishing success for each of the four species surveyed (chinook, sockeye, chum, coho). The majority of subsistence fishers responding felt that the quality of their subsistence fishing was very good or average (Table 16). Seventy-three percent of the responding households reported that chinook fishing was very good or average. Two-thirds (67 %) of Kuskokwim fishers felt that their chum salmon harvests were average or better. Seventy percent of households reported that subsistence harvests of sockeye were very good or average. In spite of the fact that coho catches were the lowest on record, a majority of fishers in each region reported that their subsistence harvest of coho were very good or average.

Subsistence fishers from communities located within the Lower Kuskokwim River area (District 1) and South Kuskokwim Bay (Districts 4 and 5) generally reported the quality of their subsistence fishing results higher than fishers in other areas. High water during July made subsistence fishing difficult for fishers located in the Middle and Upper Kuskokwim river areas. Several households located in communities from Red Devil to Lime Village reported relatively poor quality subsistence fishing for all four salmon species.

## **PART II: FRESHWATER FINFISH FISHERY**

Several species other than salmon, herring and halibut are used for commercial, subsistence, and recreation purposes in the Kuskokwim Area. They are inconnu or sheefish (*Stenodus leucichthys*), whitefish (*Coregonus*) and (*Prosopium*) char (*Salvelinus*), burbot (*Lota lota*), Arctic grayling (*Thymallus arcticus*), northern pike (*Esox lucius*), Arctic lamprey (*Lampetra japonica*), rainbow smelt (*Osmerus mordax*) blackfish (*Dallia pectoralis*), rainbow trout (*Oncorhynchus mykiss*), lake trout (*Salvelinus namaycush*), threespine stickleback (*Gasterosteus aculeatus*), ninespine stickleback (*Pungitius pungitius*), and longnose sucker (*Catostomus catostomus*). The Division of Sport Fish documents the recreational fisheries.

### ***Subsistence Fishery***

Methods used for harvesting subsistence freshwater finfish include set and drift gillnets, seine, fish wheels, long lines, dip nets, jigging (hook and line through the ice), and pots (locally called "traps"). Subsistence harvests occur year round. These fish may be eaten fresh, dried, smoked

or frozen. Most are used for human consumption; however, some are also used for dog food. Regulations do not limit the number of freshwater fish that may be harvested for subsistence. Harvest data for these species are not collected on an annual basis. Data for some Kuskokwim Area communities may be found in the Division of Subsistence Technical Paper series.

### ***Commercial Fishery***

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Some of the whitefish harvest occurs under the ice in the winter.

A permit from the Commercial Fisheries Entry Commission is required. A permit from the department to conduct commercial fisheries on whitefish, pike, smelt, burbot and lamprey is also required. Those species may also be taken incidentally to commercial salmon fishing. No freshwater permits were issued by the Bethel CF office in 1998 for the Kuskokwim Area. The guidelines for permits are:

1. All waters of the area except the Johnson River drainage and Whitefish Lake are open to commercial harvest of freshwater finfish. The heavy subsistence utilization of freshwater species in these areas is the reason for the closure.
2. Only whitefish, cisco, smelt, pike, burbot, and lamprey may be taken. Sheefish, char and trout may not be taken due to their small population, low reproductive rates and their heavy utilization in the subsistence and sport fisheries.
3. All legal commercial gear types are allowed.
4. Gillnets must be greater than 2 1/2 and less than 5 inches stretch mesh. Long lines and set lines must use hooks with a gap between point and shank larger than 3/4 inch.

Appendix F.1 presents the freshwater finfish fishery catches and value since 1977. No commercial landings of whitefish were documented in 1998 (Appendix F.1).

### ***Stock Status***

The department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited department observations, advisory committee recommendations and fishers interviews give no indication of declining populations in most drainages. Residents of Kasigluk, Atmautluak and Nunapitchuk have expressed concerns that subsistence fishers are overexploiting the whitefish stocks in Nunavakpak Lake (near Kasigluk).



### **PART III: MISCELLANEOUS SALTWATER FINFISH**

A poorly documented commercial fishery on Saffron or "Tom Cod" (*Eleginus gracilus*) has occurred in the Kuskokwim Area for some time. These fish were surplus to subsistence needs and fishers and local stores were, and often still are, unaware of the regulatory requirements. The department has been trying to inform buyers and sellers of these requirements. Since 1988, we have had information on the sale of fish exported from the coastal villages to Bethel. Sales within the villages are still undocumented. No commercial landings were documented in 1998 (Appendix G.1).

### **PART IV. HERRING FISHERY**

#### **INTRODUCTION**

##### ***Area and District Boundaries***

There are five commercial gillnet sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 8). The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ukfigag and Tunulik Rivers. The Cape Avinof District (Figure 9) consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Ishkowik River (162° 44' W. long) to the longitude of the Ursukfak River (164° 11' W. long). The Nelson Island District consists of all waters north of Chinigyak Cape and east of Atrnak Point, and all waters north of Talurarevuk Point and south of the southernmost tip of Chinit Point and east of 165° 30' W. long., and all waters north of the northernmost tip of Chinit Point and south of Kigigak Island and east of 165° 30' W. long. (Figure 10). The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Kikoojit Rocks (60° 20' 00" N. lat., 166° 39' 05" W. long.) to Kaksajookalik Island (59° 45' 10" N. lat., 166° 14' 20" W. long.), the western most point of Cape Mendenhall (Figure 11).

##### ***Management Programs***

The Security Cove, Goodnews Bay and Nunivak Island commercial herring fisheries are managed under the Bering Sea Herring Fishery Management Plan which sets the maximum exploitation rate at 20% of the estimated spawning biomass. The department attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the exploitation range (15-20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0-15%). The Alaska Board of Fisheries has directed the department to manage the commercial herring fisheries in the Nelson Island and Cape Avinof Districts for an exploitation rate not to exceed 15% of the estimated available biomass. To provide additional protection for the subsistence herring harvest in the Nelson Island District, the Board of Fisheries has established the following guidelines:

1. The commercial fishery will be allowed to take up to 20% of the herring biomass minus 200 st for subsistence, compared to up to 20% for most other fisheries having stocks of similar size and condition.
2. The commercial fishing season will be opened when a biomass of 3,000 tons or spawning activity is documented.
3. Periodic closures of the commercial fishery will be scheduled, during which time only subsistence fishing will be allowed.
4. Several important subsistence use areas occur throughout the district (e.g. waters around Cape Vancouver) and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.
5. The department will use all available means, including input from local residents, to insure the adequacy of subsistence herring harvests during the commercial fishing season.

All Kuskokwim Area commercial herring fisheries are opened and closed by emergency order to provide for an orderly fishery and allow periodic assessment of herring biomass. In 1990, the Nelson and Nunivak Island Districts were given limited entry status by the Commercial Fisheries Entry Commissions (CFEC). Entry permits were issued to qualified applicants who had fished in these fisheries before 1 January 1988. The Goodnews Bay District was closed to new entry beginning in 1997 and given limited entry status. CFEC held meetings in 1998 to determine a qualification system that will result in 182 limited entry permits being issued.

### ***Season Summary***

The total Kuskokwim Area Pacific herring harvest for 1998 was 3,951 tons with a total estimated value to fishers of approximately \$735,000 (Appendix H.1). The average price paid in all districts was \$200 per ton for 10% roe recovery, with an increase or decrease of \$20 per ton for each percentage point above or below 10%. This was well below the 1996 price of \$600 per ton and the same as in 1997. Commercial fisheries occurred in all districts. The sac roe harvest was 3,951 tons. No herring were sold as bait. The only food/bait sales in this area occur during the sac roe fishery when the roe content is below the processors' acceptable minimums.

Fishing effort, measured in number of fishers who made deliveries, continued to decline for the third straight year. Effort was reduced by 65% in Security Cove, 40% in Goodnews Bay, 18% at Nelson Island, 42% at Nunivak Island and 25% at Cape Avinof (Appendix H.2). Three hundred sixty-four permit holders landed herring in the Kuskokwim Area, a decrease of 58% from 1997. Average income per permit holder (excluding Nunivak Island) ranged from \$1,202 in the Cape Avinof District to \$2,743 at Nelson Island (Appendix H.3). Eleven companies bought herring in the Kuskokwim Area in 1998. Average roe recovery, from sac roe quality herring, ranged from 9.8% in the Nunivak Island District to 11.8% in the Nelson Island District. The overall average sac roe content was 11.2%. Exploitation rates in individual districts (excluding Nunivak) ranged from 15% in the Nelson Island District to 25% in the Security Cove District (Appendix H.1).

The 1998 total estimated herring spawning biomass was 23,282 tons for the surveyed portion of the Kuskokwim Area herring districts. This was 11% lower than the 1997 estimate (Appendix H.1). Ages 9 and older herring comprised 37% of the total biomass (Table 17). Recruit herring (ages 3, 4, and 5) accounted for 39% of the total run in number of fish (Table 18).

## **STOCK STATUS**

### ***Assessment Methods***

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of herring. Occurrence and extent of milt, numbers of fishing vessels and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978.

Approximately 17 hours were spent conducting aerial surveys in the Kuskokwim Area in 1998: 6.1 hours in Security Cove and Goodnews Bay, 0.7 hours in the Cape Avinof District, 3.4 hours in Nelson Island and 6.1 hours in Nunivak Island districts respectively. Weather and sea conditions were poor throughout the Kuskokwim Bay Districts for most of the season, with most surveys being conducted under poor conditions.

Standard conversions of 1.52 tons/538 ft<sup>2</sup> (water depths less than 16 ft), 2.58 tons/538 ft<sup>2</sup> (water depths between 16 and 26 ft) and 2.83 tons/538 ft<sup>2</sup> (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass within all districts.

Test fishing with variable mesh gillnets occurred in all districts to determine age, sex, size and sexual maturity of herring and to note occurrence of other schooling fishes. The sampling goal for test fish catches was to sample a minimum of 60 herring per day or 420 per week from each district. Commercial landings were sampled in all fishing districts. Age composition of herring collected from the department test fishery and the commercial catch is summarized, by district, in Table 18. Additionally, volunteer commercial gillnet vessels collected herring samples within all districts that industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production. This information also allows interpretation and modification of aerial survey biomass data.

Ground surveys conducted in some districts provide information on the distribution and density of eelgrass beds and herring spawn deposition.

## ***Spawning Populations***

### **Security Cove District**

Six aerial surveys were flown from 5 May to 29 May. Conditions on all surveys were poor. Herring spawn was observed on survey flights conducted on 5 and 6 May but not thereafter. On 6 May aerial surveys estimated a total of 1,629 tons of herring in the district. The herring biomass expected to return to the Security Cove District in 1998 was 4,017 tons based on preseason projections. This estimate was used as the total biomass estimate for 1998. A total of 6.5 miles of spawn was observed in the district with peak spawning activity (3.5 miles) on 6 May.

The Security Cove test fish crew operated from 5 May to 24 May with variable mesh gillnets. A total of 667 fish were sampled for age-sex-length data. Age 9 and older herring comprised 38% of the biomass (Table 17) while 3- to 5-year-old fish accounted for 51% of the return in numbers of fish (Table 18).

### **Goodnews Bay District**

Six aerial surveys were flown in the Goodnews Bay District between 5 May and 29 May in 1998. A portion of the survey on 5 May in Goodnews Bay was rated as fair, the rest were flown under poor or unsatisfactory conditions. The largest concentration of herring was observed during the survey flown on 29 May and was estimated at 226 tons. The herring biomass expected to return to the Goodnews Bay District in 1998 was 4,064 tons based on preseason projections. This preseason biomass estimate was used as the biomass estimate for 1998. No spawning was observed in the district in 1998.

Test fishing occurred from 5 May to 27 May. Age 9 and older herring made up 47% of the biomass (Table 17) while age 3 to 5 fish were 30% of the return in numbers of fish (Table 18).

### **Cape Avinof District**

In 1998 one aerial survey was flown under poor conditions in the Cape Avinof District. The flight occurred on 6 June. An estimated 147 tons of herring were observed. The total biomass present in the district was estimated to be 4,287 tons. Approximately 0.5 miles of spawning activity was observed during this single survey flight.

The Department's test fishery near Kipnuk captured 643 herring between 27 May and 4 June to sample for age-sex-size data. Age 9 and older herring made up 34% of the biomass (Table 17) while age 3-5-year-old herring represented 40% of the return in numbers of fish (Table 18).

### **Nelson Island District**

Eight aerial surveys were flown on seven days from 10 May to 3 June during the 1998 season. None of these surveys were conducted under acceptable conditions although, during an aerial survey on 25 May, an estimated 1,544 tons of herring were observed. Since no acceptable surveys occurred, the preseason forecasted biomass of 7,136 tons was used as the total biomass estimate for 1998. A total of 5.4 miles of spawn was observed during aerial surveys of the district. Peak spawning was observed on 25 May when an estimated 4.0 miles of spawning activity was observed.

Test fishing with variable mesh gillnets occurred from 24 May to 30 May. Age, sex, size and maturity information was taken from 1,467 herring. Age 9 herring made up 35% of the biomass (Table 17) while age 3 to 5 herring accounted for 38% of the numbers of fish (Table 18).

### **Nunivak Island District**

Four aerial surveys were flown on four days between 10 May and 6 June in the Nunivak Island District during the 1998 season. Two surveys were made under marginally acceptable conditions. During an aerial survey on 20 May, 600 tons of herring were observed. Total biomass was assumed to be 3,778 tons based on the projected return from the 1997 escapement. A total of 3.0 miles of spawning activity was observed during aerial surveys.

371 fish were sampled for age-sex-length data from purse seine catches. Age 7 and older herring comprised 20% of the biomass (Table 17) while fish 3 to 5 years old accounted for 54% of the return in numbers of fish (Table 18).

### **Central Kuskokwim Bay**

The Central Kuskokwim Bay area extends from Jacksmith Bay, south of Quinhagak, to the Ishkowik River (Figure 1). No commercial herring fishing districts are located in this area. Three aerial surveys were flown in this area from 5 May to 29 May. None of these surveys were flown under satisfactory conditions. No herring or spawn was observed during these surveys.

### **SUBSISTENCE FISHERY**

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Umkumiut, Nightmute, Tununak and Newtok. The herring stocks utilized by the subsistence fishery are the same ones targeted by the commercial fishery in the nearby commercial fishing districts.



Subsistence harvest surveys have occurred annually in Nelson Island villages from 1985 to 1996 and sporadically in Kuskokwim delta villages since 1975. Average annual herring subsistence harvests have been at least 110 tons since 1975 (Burkey et al. 1998). No subsistence surveys were conducted of Kuskokwim Area communities in 1998. Subsistence survey results reflect harvest trends and reported catches represent minimum figures since not all fishers are contacted and other Kuskokwim River delta villages were not surveyed.

## **COMMERCIAL FISHERY**

### ***Security Cove District***

The total harvest in 1998 in the Security Cove District was 1,012 tons of sac roe herring with an average roe content of 11.5%. Nine processors bought herring from 78 permit holders who made 255 deliveries in seven periods with 28.5 hours total fishing time. The estimated exvessel value was \$202,340. The exploitation rate was 25% based on the preseason biomass projection of 4,017 tons.

On 9 May, the first period opened for 7.5 hours starting at 3:30 PM (Table 19). Four permit holders delivered 37 tons of sac roe quality herring with an average roe content of 10.6%. The second opening occurred on 10 May for six hours starting at 5:30 PM. Four permit holders delivered 17.8 tons of herring with a 10.9% average roe content. The final period was for three hours on 13 May starting at 9:30 AM. Fifty-nine permit holders delivered 274 tons of herring with an 11.1% average roe content.

A total of 324 herring were sampled from the commercial catch. Age composition of fish in this sample was 69% age 9 or older, and 31% age 6 to 8 of the return in numbers of fish (Table 18). Fish less than 6-years-old comprised less than 1% of the catch in numbers of fish.

### ***Goodnews Bay District***

The total harvest was 831 tons of sac roe herring with an average roe content of 11.3%. Two processors bought herring from 84 permit holders who made 580 deliveries in 12 periods with 79 hours total fishing time. The estimated exvessel value was \$166,000. The exploitation rate was 20% based on the preseason biomass projection of 4,064 tons.

On 16 May, the first period opened for 6 hours at 8:00 AM. Seven permit holders delivered 1 ton of sac roe herring with a 13.1% average roe content. The second period opened for 6 hours at 9:00 AM on 17 May. Peak harvest occurred on 20 May when 67 permit holders delivered 176.3 tons during an 8-hour opener. The last period was on 24 May when 23 permit holders delivered 42.1 tons. Catches ranged from 1 ton on 16 May to 176 tons on 20 May (Table 19).

A total of 371 herring were sampled from the commercial catch. Age composition was 65% age 9 or older, 33% age 6-8, and 2% less than age 6 in numbers of fish (Table 18).

### ***Cape Avinof District***

The total harvest was 656 tons of sac roe herring with an average roe content of 11.6%. Two processors bought herring from 109 permit holders who made 561 deliveries in eight periods with a total fishing time of 44 hours. The estimated exvessel value was \$131,000. The exploitation rate was 15% based on a biomass estimate of 4,287 tons.

On 29 May the first period opened for 4 hours starting at 8:00 PM. Twenty permit holders delivered 23 tons of herring with an 11.8% average roe content. Between 29 May and 3 June the district was opened to commercial fishing eight times for a total of 44 hours, double the time of 1997. Catches ranged from 24 tons on 31 May to 209 tons on 3 June (Table 19).

Two hundred twenty-seven herring were sampled from the commercial catch in the Cape Avinof District in 1998. Age composition of the sample was 58% age 9 or older and 41% age 6-8 in numbers of fish (Table 18).

### ***Nelson Island District***

The total harvest was 1,250 tons of sac roe herring with an average roe content of 11.8%. Three processors bought herring from 86 permit holders who made 348 deliveries in 13 periods with a total fishing time of 76 hours. The estimated exvessel value was \$236,000. The exploitation rate was 18% based on a postseason biomass estimate.

On 23 May, the first period opened for 2 hours starting at 9:00 PM (Table 19). Nine permit holders delivered 3.8 tons of sac roe quality herring with an 11.8% average roe content. The second period was for 4 hours beginning 7:00 PM on 23 May. Forty-seven permit holders harvested 23 tons of sac roe herring with an average roe content of 12.6%. The last period was for five hours starting at midnight on 30 May. Catch from this period was 218 tons of herring with 11.6% average roe content. During the final period gillnet length was limited to only 50 fathoms per boat.

A total of 422 herring were sampled from the commercial catch. Age composition was 65% age 9 or older and 35% age 6-8 in numbers of fish (Table 18).

### ***Nunivak Island District***

The commercial fishery opened on 21 May for 6 hours. Seven permit holders made a total of seven deliveries for a cumulative harvest of 2.2 tons of sac roe quality herring with an average roe content of 9.8%. Between 22 May and 23 May the District was reopened four more times for 21 hours of fishing time (Table 19). Gillnet fishers were unable to locate marketable quantities of herring and no deliveries were made.

An additional 200 tons of herring was harvested between 20 May and 24 May by purse seine as part of a combination aerial survey calibration/purse seine feasibility project conducted by the Department with the cooperation of Nunivak Island permit holders.

A total of 371 herring were sampled from the purse seine catch. Age composition was 10% age 9 or older, 36% age 6-8, and 54% less than age 6 in numbers of fish (Table 18). No herring were sampled from the commercial gillnet catch.

### ***Enforcement***

The Division of Fish and Wildlife Protection (FWP) was present in the Goodnews Bay and Security Cove Districts this year. At least 10 people from FWP were involved in Kuskokwim Bay herring fisheries. Enforcement officers utilized the P/V Walstad, two Supercub aircraft, a Cessna 185 and two FWP skiffs. Details on the number and type of violations observed are not available from FWP at this time.

## **OUTLOOK AND MANAGEMENT STRATEGY FOR 1999**

Projections from postseason escapement estimates, using historical mean rates of survival and current mean weights for each age class, and estimates of recruitment for each age class (Wespedstad 1982), suggest that the 1998 spawning biomass for the Kuskokwim Bay herring stocks (Security Cove to Nunivak Island) will be approximately 18,769 tons with a projected harvest of 3,376 tons (Table 20). If the return is as expected, a moderate reduction in biomass will be observed in all districts. However, variability in the quality of aerial survey assessments of biomass and deviations from the assumed survival or recruitment rates may result in the observed biomass being either above or below these projections. Therefore, harvest levels will be adjusted during the season according to observed herring spawning biomass. In addition, in accordance with the AYK Region harvest policy, the commercial fishery will not target newly recruited age classes (age 2 through 5 year-old-herring). If it is not possible to determine herring abundance using aerial survey methods, stock abundance will be assessed using information from the projected biomass, test and commercial catches and spawn deposition observations.

### ***Security Cove District***

The 1999 projected return to the Security Cove District is 3,060 tons. A 20% exploitation rate would result in a harvest of about 612 tons (Table 20). A larger catch may occur if the 1999 biomass assessment is greater than the projection. Commercial fishing will not be allowed until the observed biomass reaches 1,200 tons or significant spawning activity is observed. The occurrence and length of fishing periods will depend on stock strength, fishing effort, and spawning activity.

Age 6 herring are expected to dominate the return. Age 9 and older herring are expected to comprise approximately 30% of the biomass.

### ***Goodnews Bay District***

The management strategy for this district will be similar to that planned for Security Cove. The season will open and close by emergency order when a biomass of 1,200 tons is observed or spawning activity occurs. The 1999 projected return of herring to the Goodnews Bay District is 3,009 tons. A 20% exploitation rate would result in a harvest of 602 tons (Table 20). A larger catch may occur if the 1999 biomass assessment is greater than the projection.

Age 6 herring are expected to comprise approximately 20% of the biomass. Age 9 and older herring are expected to comprise 30-35% of the biomass.

### ***Cape Avinof District***

Either significant spawning activity or a biomass of 500 tons must be observed before the commercial herring season can be opened. The projected 1999 biomass for the Cape Avinof District is 3,559 tons (Table 20). The exploitation rate will be no greater than 15% because of the limited database for this area and the priority of subsistence fishing. Assuming a 15% commercial exploitation rate, the projected harvest would be 533 tons of herring.

Age 6 herring are expected to dominate the returning population. Age 9 and older herring are expected to comprise nearly 30% of the biomass.

### ***Nelson Island District***

In the Bering Sea Herring Fishery Management Plan, the Alaska Board of Fisheries set a minimum biomass threshold of 3,000 tons necessary for a commercial herring fishery in the Nelson Island District. The inseason estimate of herring biomass must exceed the threshold level before a commercial fishery can be allowed. The spawning biomass projected to return to the Nelson Island District in 1999 is 5,826 tons (Table 20). At an exploitation rate of 17%, the harvest will be 965 tons of herring. A larger catch may occur if the 1999 biomass assessment is greater than the projection.

Age 6 is expected to be the dominant age group in 1999. Age 9 and older herring are expected to comprise almost 33% of the biomass in 1999.

Guidelines established by the Board of Fisheries that provide additional protection for the subsistence harvest of herring will be followed.

### ***Nunivak Island District***

The commercial season will open when the biomass reaches 1,500 tons or when significant spawning is observed. The projected biomass of herring returning to the Nunivak Island District in 1999 is 3,319 tons. A 20% exploitation rate would result in a 664 ton harvest (Table 20). A larger catch may occur if the 1999 biomass assessment is greater than the projection.

Age 6 is expected to be the dominant age group. Age 9 and older herring are expected to comprise nearly 34% of the return.



## LITERATURE CITED

- Alaska Department of Fish and Game. 1960. Kanektok River Counting Tower, 1960. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 1, Juneau.
- Alaska Department of Fish and Game. 1961a. Kuskokwim River Salmon Tagging Studies, 1961. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Stock Separation Reports No. 1, Juneau.
- Alaska Department of Fish and Game 1961b. Kanektok River Counting Tower, 1961. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 2, Juneau.
- Alaska Department of Fish and Game. 1962a. Kuskokwim River Salmon Tagging Studies, 1962. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Stock Separation Reports No. 2, Juneau.
- Alaska Department of Fish and Game. 1962b. Kanektok River Counting Tower, 1962. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 3. Juneau.
- Alaska Department of Fish and Game. 1966. Kuskokwim River Salmon Tagging Studies, 1966. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Stock Separation Reports No. 3. Juneau.
- Alaska Department of Fish and Game. 1984. Kuskokwim Area commercial and subsistence salmon fisheries, 1984 management plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Regional Kuskokwim Salmon Management Plan #10. Anchorage.
- Alaska Department of Fish and Game. 1985. Kuskokwim Area Commercial and Subsistence Salmon Fisheries, 1985 Management Plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Regional Kuskokwim Salmon Management Plan #11. Anchorage.
- Alaska Department of Fish and Game. 1997. Review of the Bristol Bay salmon fishery 1997, annual salmon management report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Informational Report No. 2A97-28. Anchorage.

### LITERATURE CITED (Continued)

- Anderson, C. A., 1991. Kuskokwim Management Area Salmon Catch and Escapement Statistics, 1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 91-04, Juneau.
- Anderson, C, and three co-authors. 1994. Report to the Alaska Board of Fisheries, Kuskokwim Area salmon, 1994. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A94-30. Anchorage.
- Anderson, C. A., 1995. Kuskokwim Management Area Salmon Catch and Escapement Statistics, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 95-08, Juneau.
- Baxter, R., 1970. Kuskokwim Test Fishing Studies, 1966-1970. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Test Fishing Report No. 1. Anchorage.
- Baxter, R., 1976. Kogrukluk River Counting Tower Project, 1976. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 10. Anchorage.
- Baxter, R., 1977. Kogrukluk River Counting Tower Project, 1977. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 12. Anchorage.
- Beamish, R.J., and five co-authors. 1997. A comparison of the Aleutian Low Pressure Index and the Atmospheric Circulation Index as indices of Pacific salmon abundance trends. (NPAFC Doc. 289). 25 p. Department of Fisheries and Oceans, Pacific Biological Station, Nanaimo, B.C. Canada. V9R 5K6.
- Bill, D.L., et. al., 1989. Annual Management Report, 1988 Bristol Bay Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4D89-09, Anchorage.
- Brown, C.M., 1983 (Draft). Alaska's Kuskokwim River region: a history. Bureau of Land Management, State Office, Anchorage, Alaska.
- Buklis, L.S., 1993. Documentation of Arctic-Yukon-Kuskokwim Region Salmon Escapement Goals in Effect as of the 1992 Fishing Season. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A93-03. Anchorage.

### LITERATURE CITED (Continued)

- Burkey, C.E., Jr., 1990. Goodnews River Fisheries Studies, 1989. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3B90-16. Anchorage.
- Burkey, C., Jr. 1995. Kogrukluk River weir salmon escapement report, 1991-1994. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3B95-24. Anchorage.
- Burkey, C., Jr., and T. Cappiello 1996a. Kuskokwim Area salmon escapement observation catalog, 1984 through 1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A96-32. Anchorage.
- Burkey, Jr., C.E., et. al., 1996b. Report to the Alaska Board of Fisheries, Kuskokwim Area 1995. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A96-15. Anchorage.
- Burkey, C., Jr., and six co-authors. 1997a. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1995. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-22. Anchorage.
- Burkey, C., Jr., and three co-authors. 1997b. Report to the Alaska Board of Fisheries, Kuskokwim area, 1997. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-44. Anchorage.
- Burkey, C., Jr., and eight co-authors. 1998. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A98-11. Anchorage.
- Burkey, Jr., C.E., et. al. 1999. Annual Management Report of the Subsistence and Commercial Fisheries of the Kuskokwim Area, 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A99-12, Anchorage.
- Cappiello, T. and C. Burkey, Jr., 1997. Kogrukluk River Weir Salmon Escapement Report, 1995 - 1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-18, Anchorage.
- Cappiello, T. 1998a. Kogrukluk River weir salmon escapement report, 1997. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A98-17. Anchorage.

### LITERATURE CITED (Continued)

- Cappiello, T. and R. Sundown. 1998b. Kwethluk River counting tower salmon assessment project, 1996-1997. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A98-34. Anchorage.
- Coffing, M., 1991. Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use, and the Subsistence Economy of A Lower Kuskokwim River Area Community. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 157, Juneau.
- Fox, Frank, 1997. Final Report for Kanektok River salmon escapement monitoring project grant from Bering Sea Fisherman's Association April 1, 1997. The Native Village of Kwinhagak, Quinhagak I.R.A. Council, Natural Resources Program, Quinhagak.
- Francisco, R.K., and four co-authors, 1988. Report to the Alaska Board of Fisheries, Kuskokwim Area salmon, 1988. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3B88-37. Anchorage.
- Francisco, R.K., and eight co-authors. 1990. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1989. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3A90-25. Anchorage.
- Francisco, R.K., and seven co-authors. 1991. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1990. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3A91-11. Anchorage.
- Francisco, R. K., et. al. 1992. Annual Management Report for the Subsistence and Commercial Fisheries of the Kuskokwim Area, 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A92-06, Anchorage.
- Francisco, R.K., and three co-authors. 1994a. Report to the Alaska Board of Fisheries, Kuskokwim Area salmon, 1993. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A94-03. Anchorage.
- Francisco, R.K., and six co-authors, 1994b. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1993. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A94-21. Anchorage.

### LITERATURE CITED (Continued)

- Francisco, R.K., and six co-authors, 1995. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1994. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A95-15. Anchorage.
- Hamner, H., 1986. Migratory Timing of Coho Salmon in the Kuskokwim Area, 1979-1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 46. Juneau.
- Hare, S.R., N.J. Mantua and R.C. Francis. 1999. Inverse production regimes: Alaska and west coast Pacific Salmon. *Fisheries*. 24(1): 6-14.
- Harper, K.C., 1995a. Run Timing and Abundance of Adult Salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 1991. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Progress Report Number 95-1. Kenai, Alaska.
- Harper, K.C., 1995b. Run Timing and Abundance of Adult Salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 1992. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Progress Report Number 95-3. Kenai, Alaska.
- Harper, K.C., 1995c. Run Timing and Abundance of Adult Salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 1993. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Progress Report Number 95-2. Kenai, Alaska.
- Harper, K.C. 1997. Run timing and abundance of adult salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 1994. U. S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Technical Report Number 41. Kenai, Alaska.
- Harper, K.C., 1998. Run Timing and Abundance of Adult Salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 1992. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Technical Report Number 44. Kenai, Alaska.
- Howe, A.L., and three co-authors. 1996. Harvest, Catch, and Participation in Alaska Sport Fisheries During 1995. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Data Series No. 96-32, Anchorage.
- Huttunen, D. C., 1984a. Abundance, Age, and Size of Salmon (*Oncorhynchus* spp.) Catches and Escapements in the Kuskokwim Area, 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report No. 111, Juneau.



### LITERATURE CITED (Continued)

- Huttunen, D.C., 1984b. 1982-1983 Kuskokwim River Test Fishing Projects. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 13. Juneau.
- Huttunen, D.C., 1984c. 1984 Kanektok River Sonar Project Report, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report No. 40. Anchorage.
- Huttunen, D.C., 1985a. Abundance, Age, and Size of Salmon (*Oncorhynchus* spp.) Catches and Escapements in the Kuskokwim Area, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report No. 133, Juneau.
- Huttunen, D.C., 1985b. Kuskokwim River Salmon Test Fishing, 1984. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 15. Juneau.
- Huttunen, D.C., 1985c. 1985 Kanektok River Sonar Project Report. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 42. Anchorage.
- Huttunen, D.C., 1986a. 1986 Kanektok River Sonar Project Report, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report No. 43. Anchorage.
- Huttunen, D.C., 1986b. Abundance, Age, and Size of Salmon (*Oncorhynchus* spp.) Catches and Escapements in the Kuskokwim Area, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report No. 186, Juneau.
- Huttunen, D.C., 1986c. Kuskokwim River Test Fishing Report, 1986. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 16. Juneau.
- Huttunen, D.C., 1987a. Abundance, Age, and Size of Salmon (*Oncorhynchus* spp.) Catches and Escapements in the Kuskokwim Area, 1985. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report No. 212, Juneau.
- Huttunen, D.C., 1987b. 1986 Kuskokwim River Salmon Abundance Estimation Based on Calibrated Test Fishing CPUE Data. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 17. Juneau.

### LITERATURE CITED (Continued)

- Huttunen, D.C., 1988. Kanektok River Sonar Project, 1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3B88-04. Anchorage.
- Huttunen, D.C., 1989. Abundance, Age, and Size of Salmon (*Oncorhynchus* spp.) Catches and Escapements in the Kuskokwim Area, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, ADF&G Technical Fishery Report No. 89-21. Juneau.
- Hyer, K.E., et. al 1996. Kuskokwim River Sonar Progress Report, 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A96-24, Anchorage.
- Jones, H., 1995. Summary of Effort, Harvest and Catch Statistics for Sport Fisheries in Southwest Alaska, 1977-1994. Alaska Department of Fish and Game, Division of Sport Fish, Dillingham.
- Jonrowe, D.A.S., et. al., 1982. Annual Management Report 1981, Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Knuepfer, G., 1988. Aniak River sonar test fishing feasibility report, 1995. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A95-34. Anchorage.
- Kuhlmann, F.W., 1973. Kogruklu River Counting Tower Project, 1973. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 7. Anchorage.
- Kuhlmann, F.W., 1974. Kogruklu River Counting Tower Project, 1974. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 8. Anchorage.
- Kuhlmann, F.W., 1975. Kogruklu River Counting Tower Project, 1975. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 9. Anchorage.
- Kuskokwim Fishermen's Cooperative, 1991. Kuskokwim Fishermen's Cooperative, Kuskokwim River Salmon Management Working Group, Subsistence Survey Final Report, 1990. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3B91-01. Anchorage.

### LITERATURE CITED (Continued)

- Kruse, G. H. 1998. Salmon run failures in 1997-1998: a link to anomalous ocean conditions? Alaska Fishery Research Bulletin 5 (1):55-63.
- Mantua, N.J., and four co-authors. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bulletin of the American Meteorological Society. 78 (6):1060-1079.
- Menard, J., 1998a. Middle Fork Goodnews River fisheries studies, 1990-1997. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3A98-30. Anchorage.
- Menard, J. and A. Caole., 1998b. Kanektok River counting tower cooperative project, 1997. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 3A99-16. Anchorage.
- Mesiar, D.C., and two co-authors, 1994. Kuskokwim River Sonar Progress Report, 1989-1990. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A94-12. Anchorage.
- Minard, R.E., and two co-authors, 1998. Area Management Report for the Recreational Fisheries of the Southwest Alaska Sport Fish Management Area, 1997. Alaska Department of Fish & Game, Division of Sport Fisheries, Fishery Management Report. No. 98-3. Anchorage.
- Molyneaux, D.B., 1994. Bethel Salmon Test Fish Project, 1991. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, Fisheries Technical Fisheries Report No. 34-20, Anchorage.
- Molyneaux, D.B. and L. DuBois, 1996. Salmon Age, Sex, and Length Catalog for the Kuskokwim Area, 1995 Progress Report. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A96-31, Anchorage.
- Molyneaux, D.B., 1997a. Data Summary for the Kuskokwim River Salmon Test Fishery at Bethel, 1984-1997. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-47. Anchorage.
- Molyneaux, D.B., and two co-authors. 1997b. George River weir salmon escapement project, 1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-27. Anchorage.

### LITERATURE CITED (Continued)

- Molyneaux, D.B. 1998. Data summary for the Kuskokwim River salmon test fishery at Bethel, 1984-1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A98-33. Anchorage.
- NOAA (National Oceanic and Atmospheric Administration). 1999. Draft report on the FOCI international workshop on recent conditions in the Bering Sea, Nov. 9-10, 1998. NOAA Western Regional Center, Seattle.
- Oswalt, W.H., 1990. Bashful no longer: an Alaskan Eskimo ethnohistory, 1778-1988. University of Oklahoma Press, Norman, Oklahoma.
- Pennoyer, S., and two co-authors, 1965. Arctic-Yukon-Kuskokwim Area Salmon Fishing History. Alaska Department of Fish & Game, Division of Commercial Fisheries, Informational Leaflet No. 70. Juneau.
- Pete, M.C., 1992. Subsistence Herring Fishing in the Nelson Island and Nunivak Island Districts, 1992. Alaska Department of Fish & Game, Division of Subsistence, Technical Paper No. 221. Fairbanks.
- Schneiderhan, D.J., 1979. 1978 Kuskokwim River Sonar Studies. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 16. Anchorage.
- Schneiderhan, D.J., 1980. 1979 Kuskokwim River Sonar Studies. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 18. Anchorage.
- Schneiderhan, D.J., 1981. 1980 Kuskokwim River sonar studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Kuskokwim Escapement Report No. 19. Anchorage.
- Schneiderhan, D.J., 1982a. 1981 Kuskokwim River Sonar Studies. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 22. Anchorage.
- Schneiderhan, D.J. 1982b. 1981 Salmon River weir studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Kuskokwim Escapement Report Number 21. Anchorage.
- Schneiderhan, D.J., 1982c. 1982 Aniak River Sonar Studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 26, Anchorage.

### LITERATURE CITED (Continued)

- Schneiderhan, D.J., 1982d. 1982 Salmon River Weir Studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 29, Anchorage.
- Schneiderhan, D.J., 1984a. 1982 Ignatti Weir Study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 30, Anchorage.
- Schneiderhan, D.J., 1984b. 1983 Ignatti Weir Study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 31, Anchorage.
- Schneiderhan, D.J., 1984c. 1983 Aniak River Sonar Study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 32, Anchorage.
- Schneiderhan, D.J., 1985a. Salmon Escapement Study, Kogruklu River Weir, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 35, Anchorage.
- Schneiderhan, D.J., 1985b. 1984 Aniak River Salmon Escapement Study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 36, Anchorage.
- Schneiderhan, D.J., 1988a. Aniak River Salmon Escapement Study, 1985-1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-17, Anchorage.
- Schneiderhan, D.J., 1988b. Kuskokwim Area Salmon Escapement Observation Catalog 1984-1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3B88-29, Anchorage.
- Schneiderhan, D.J., 1988c. Aniak River Salmon Escapement Study, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-33, Anchorage.
- Schneiderhan, D.J., 1988d. Kogruklu Weir Salmon Escapement Study 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A89-09, Anchorage.
- Schneiderhan, D.J., 1988e. Kogruklu Weir Salmon Escapement Study 1985-1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-16, Anchorage.



### LITERATURE CITED (Continued)

- Schneiderhan, D.J. 1989. Aniak River Salmon Escapement Study, 1989. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A89-24, Anchorage.
- Schultz, K. and P. Carey, 1982. Kanektok River Sonar Enumeration Project, 1982. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 27. Anchorage.
- Schultz, K. and M. Williams, 1984. Kanektok River Sonar Enumeration Project, 1983. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 37. Anchorage.
- Vania, T.D. and D.C. Huttunen, 1997. Aniak River Sonar Project Report, 1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 3A97-20. Anchorage.
- Vania, T.D. 1998. Aniak River sonar project report, 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A98-05. Anchorage.
- Wagner, T.A., 1991. Southwestern Alaska Rainbow Trout Investigations, Kanektok River, Togiak National Wildlife Refuge, Alaska 1985-1987 Final Report. U.S. Fish and Wildlife Service, King Salmon Fishery Assistance Office. King Salmon.
- Wespedstad, V.G., 1982. Cohort Analysis of Catch Data on Pacific Herring in the Eastern Bering Sea, 1959-81. Nat. Oceanic and Atmospheric Admin., Nat. Marine Fisheries Service, Tech. Memo. NMFS F/NWC-24, Seattle.
- Yanagawa, C.M., 1972a. Kogruklu River Counting Tower Project, 1969-70. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 4. Anchorage.
- Yanagawa, C.M., 1972b. Kogruklu River Weir Project, 1971. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 5. Anchorage.
- Yanagawa, C.M., 1973. Kogruklu River Counting Tower Project, 1972. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 6. Anchorage.

# TABLES

Table 1. Salmon run assessment programs operated in the Kuskokwim Area during 1998.

Project Name	Location	Primary Objectives	Duration	Agency	Responsibility
Salmon Management Plan	Kuskokwim Area	- develop a comprehensive plan for managing salmon stocks of the Kuskokwim Area. - define goals and objectives. - identify potential opportunities and concerns. - recommend appropriate procedures. - evaluate priorities.	June - Sept.	ADFG/CF	all aspects
Subsistence Catch and Effort Assessment	Kuskokwim Area	- document and estimate the catch and associated effort of the subsistence salmon fisheries via interviews, catch calendars, mail-out questionnaires and telephone interviews.	Post-season	ADFG/S	all aspects
Escapement Sampling	Kuskokwim Area	- estimate age, sex and length of chinook, sockeye, chum and coho salmon from selected tributary spawning populations.	June - Sept	ADFG/CF	all aspects
Aerial Surveys	Kuskokwim Area	- index relative abundance of chinook salmon spawning escapement in selected streams throughout the Kuskokwim Area. - index relative abundance of sockeye salmon spawning escapement in the Kanektok and Goodnews Rivers.	July - Aug	ADFG/CF	all aspects
Sport Catch, Harvest and Effort Assessment	Kuskokwim Area	- statewide mail-out survey to estimate sport catch, harvest and effort	post-season	ADFG/SF	all aspects
Commercial Catch and Effort Assessment	Districts 1, 2, 4 and 5	- document and estimate the catch and associated effort of the commercial salmon fishery via receipts (fish tickets) of commercial sales and dock side sampling.	June - Sept	ADFG/CF	all aspects
Commercial Catch Sampling	Districts 1, 4 and 5	- determine age, sex, and length of salmon harvested in the commercial fisheries.	June - Sept	ADFG/CF	all aspects
Bethel Test Fishery	Bethel Area RM. 80	- index relative run timing of chinook, sockeye, chum and coho salmon using drift gillnets - index relative run abundance of chinook, sockeye, chum and coho salmon using CPUE derived from drift gillnet catches.	June - Aug	ADFG/CF	all aspects
Kwethluk River Counting Tower	mile 51 Kwethluk River RM. 99	- estimate daily escapement of chinook, sockeye, chum and pink salmon into the Kwethluk River.	June - July	AVCP	all aspects
				ADFG/CF	planning, supplies & crew support
				USFWS	planning & supplies
				BSFA	funding
Aniak River Sonar	mile 12 Aniak River RM. 225	- estimate daily escapement of salmon into the Aniak River. - estimate age, sex and length composition of chum salmon escapement	June - July	ADFG/CF	all aspects
				AVCP	crew support

- continued -

Table 1. (page 2 of 2)

Project Name	Location	Primary Objectives	Duration	Agency	Responsibility
George River Weir	mile 4 George River RM. 309	- estimate daily escapement of chinook, sockeye, chum, pink and coho salmon into the George River. - estimate age, sex and length composition of chinook, chum and coho salmon escapement. - collect environmental / habitat information	June - Sept	KNA	all aspects
				ADFG/CF	all aspects
				BSFA	funding
Kogrukluk River Weir	mile 85 Holitna River Drainage RM. 335	- estimate daily escapement of chinook, sockeye, chum and coho salmon into the Kogrukluk River. - estimate age, sex and length composition of chinook, chum and coho salmon escapement	June - Sept	ADFG/CF	all aspects
Tatlawiksuk River Weir	mile 2.5 Tatlawiksuk River RM. 383	- estimate daily escapement of chinook, sockeye, chum, pink and coho salmon into the Tatlawiksuk River. - estimate age, sex and length composition of chinook, chum and coho salmon escapement. - collect environmental / habitat information	June - Sept	KNA	all aspects
				ADFG/CF	all aspects
				BSFA	funding
				BIA NFWF	
Takotna River Counting Tower	mile 35 Takotna River RM. 507	- estimate daily escapement of chinook and chum salmon into the Takotna River.	June - July	TCS	all aspects
				ADFG/CF	planning & supplies
				BSFA	funding
Kanektok River Weir	mile 13 Kanektok River Kuskokwim Bay	- estimate daily escapement of chinook, sockeye, chum pink and coho salmon into the Kanektok River. - estimate age, sex and length composition of chinook and chum salmon escapement.	June - Sept	NVK	all aspects
				ADFG/CF	planning, supplies & crew leader
				USFWS	planning, supplies and funding
				BSFA BIA	funding
Middle Fork Goodnews River Weir	mile 5 Middle Fork Goodnews River Kuskokwim Bay	- estimate daily escapement of chinook, sockeye, chum, pink and coho salmon into the Middle Fork Goodnews River. - estimate age, sex and length composition of chinook, sockeye, chum and coho salmon escapement	June - Sept	ADFG/CF	all aspects
				USFWS	funding for coho extension

ADFG/CF = Commercial Fisheries Division; Alaska Department of Fish and Game  
 ADFG/S = Subsistence Division; Alaska Department of Fish and Game  
 ADFG/SF = Sport Fish Division; Alaska Department of Fish and Game  
 AVCP = Association of Village Council Presidents  
 BIA = Bureau of Indian Affairs  
 BSFA = Bering Sea Fishermen's Association

KNA = Kuskokwim River Native Association  
 NFWF = National Fish and Wildlife Foundation  
 NMFS = National Marine Fisheries Service  
 NVK = Native Village of Kwinhagak  
 TCS = Takotna Charter School  
 USFWS = U.S. Fish and Wildlife Service

Table 2. Kuskokwim Area salmon entry permits issued by village, 1998

<b>Village</b>	<b>Number of Entry Permits</b>
Akiachak.....	67
Akiak.....	24
Aniak.....	11
Atmautluak.....	28
Bethel.....	169
Chefornak.....	3
Chuathbaluk.....	2
Eek.....	37
Goodnews Bay.....	28
Kalskags.....	7
Kasigluk.....	43
Kipnuk.....	15
Kongiganak.....	19
Kwethluk.....	55
Kwigillingok.....	18
Mekoryuk.....	1
Napakiak.....	39
Napaskiak.....	36
Nunapitchuk.....	46
Oscarville.....	1
Platinum.....	4
Quinhagak.....	84
Sleetmute.....	1
Tuluksak.....	27
Tuntutuliak.....	43
Tununak.....	1
<b>KUSKOKWIM AREA SUBTOTAL.....</b>	<b>809</b>
Anchorage.....	11
Dillingham.....	1
Fairbanks.....	1
Manokotak.....	1
Wasilla.....	1
<b>NON-LOCAL ALASKA RESIDENTS SUBTOTAL.....</b>	<b>15</b>
Valencia, CA.....	1
Alpharetta, GA.....	1
Honey In The Hills, FL.....	1
Comstock, TX.....	1
Florence, OR.....	1
Tacoma, WA.....	1
<b>NON-RESIDENT SUBTOTAL.....</b>	<b>6</b>
<b>TOTAL NUMBER OF PERMITS.....</b>	<b>830</b>



Table 3. Harvest and ex-vessel value of Kuskokwim Area salmon catch by district, 1998.

<u>Lower Kuskokwim River, District W-1</u>						
	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
			<u>1998</u>			
Fish	17,356	60,906	210,168	92	207,698	496,220
Pounds	247,958	419,739	1,563,708	345	1,410,051	3,641,801
Price	0.30	0.50	0.33	0.16	0.13	
Value	\$74,387	\$209,870	\$516,024	\$55	\$183,307	\$983,642
			<u>Ave. 1988-97</u>			
Fish	29,954	63,099	527,743	5,500	437,645	1,063,941
Value	\$305,989	\$391,253	\$1,982,019	\$1,870	\$872,406	\$3,553,537
<u>Middle Kuskokwim River, District W-2</u>						
			<u>1998</u>			
Fish	3	0	313	0	111	427
Pounds	35	0	2,112	0	660	2,807
Price	0.26		0.25		0.12	
Value	\$9	\$0	\$528	\$0	\$79	\$616
			<u>Ave. 1988-97</u>			
Fish	1,145	1,452	17,919	25	13,671	34,213
Value	\$12,925	\$9,008	\$65,812	\$13	\$23,068	\$110,827
<u>Quinhagak, District W-4</u>						
			<u>1998</u>			
Fish	23,158	41,382	80,183	2,217	45,095	192,035
Pounds	326,264	268,323	660,138	8,498	320,487	1,583,7
Price	0.25	0.56	0.30	0.10	0.11	
Value	\$81,566	\$150,261	\$198,041	\$850	\$35,254	\$465,972
			<u>Ave. 1988-97</u>			
Fish	20,162	58,905	62,661	13,404	54,933	210,065
Value	\$196,049	\$290,788	\$266,617	\$4,135	\$88,363	\$845,951
<u>Goodnews Bay, District W-5</u>						
			<u>1998</u>			
Fish	3,675	27,161	21,246	411	14,155	66,648
Pounds	54,739	185,502	197,008	1,578	101,206	540,033
Price	0.25	0.54	0.30	0.11	0.11	
Value	\$13,685	\$100,171	\$59,102	\$174	\$11,133	\$184,264
			<u>Ave. 1988-97</u>			
Fish	2,670	39,882	23,586	3,864	17,608	87,609
Value	\$30,881	\$223,471	\$118,547	\$1,132	\$33,847	\$407,878
<u>Kuskokwim Area Total</u>						
			<u>1998</u>			
Fish	44,192	129,449	311,910	2,720	267,059	755,330
Pounds	628,996	873,564	2,422,966	10,421	1,832,404	5,768,351
Price	0.27	0.53	0.32	0.10	0.13	
Value	\$169,647	\$460,301	\$773,695	\$1,079	\$229,772	\$1,634,495
			<u>Ave. 1988-97</u>			
Fish	53,931	163,338	631,910	22,792	523,856	1,395,828
Value	\$545,843	\$914,520	\$2,432,996	\$7,150	\$1,017,684	\$4,918,193

Table 4. Executive summary of working group and department actions, 1998.

Date	Comment
30 Mar	Greg Hoffman Sr. (Kuskokwim Fisherman's Coop) and Henry Hill (Upriver Commercial Fisher) were elected Co-Chairs of the Working Group for the 1998 season. Henry Hill expressed his opposition to the regulation that prohibits the sale of salmon roe in District W-2. The Working Group requested that Henry draft a petition to the Board of Fisheries for their consideration. Kwethluk IRA Council nominated Raymond Nicholi to replace John Nicori as Lower Kuskokwim Subsistence representative. Other topics discussed were the outlook for the 1998 salmon return, 1997 AYK Board of Fisheries meeting, 1998 Kuskokwim River Salmon Management Plan, and the AYK sonar program rebuilding plan.
03 Apr	The Working Group failed to achieve a quorum. Another meeting was scheduled for April 17 to review the revised Working Group by-laws and review the recommendations in Phil Mundy's 1995 report entitled, Recommendations for Strengthening the Cooperative Management Process of the Kuskokwim River Salmon Management Working Group.
17 Apr	The Working Group failed to achieve a quorum. Topics discussed included a letter drafted by Henry Hill to the Board of Fisheries, on behalf of the Working Group, in opposition to the regulation prohibiting roe sales in District W-2, and a letter to solicit nominations for the Lower Kuskokwim Subsistence representative. Another meeting was scheduled for April 29 to review the revised Working Group by-laws and the recommendations in Phil Mundy's report.
29 Apr	The latest draft of the Working Group by-laws was reviewed and modifications were made for inclusion. Henry Hill's letter to the Board of Fisheries on behalf of the Working Group and discussion of Phil Mundy's recommendations was tabled until the next meeting.
04 May	The Working Group reviewed Phil Mundy's recommendations for strengthening the cooperative management process of the Working Group. The department was asked to present information on the various run assessment projects used to indicate salmon run strength in the Kuskokwim River. The Working Group voted to require their members and alternates to review this information and become familiar with how to interpret data from the projects. The department was also directed to develop a questionnaire to help members inform others about whom they represent and how the needs of the user group they represent may be accommodated in the management process. The Working Group voted not to support the letter to the Board of Fisheries in opposition to the regulation that prohibits roe sales in District W-2.

-continued-

Table 4. (page 2 of 6)

Date	Comment
10 Jun	The Working Group failed to achieve a quorum. Henry Hill resigned as Upriver Commercial Fisher representative. The department was assigned to draft and circulate a letter soliciting nominations to refill the seat. Kwethluk IRA nominated Raymond Nicholi and the Eek Traditional Council nominated William (Charlie) Brown to serve as Lower Kuskokwim Subsistence representative.
19 Jun	<p>The Working Group failed to achieve a quorum. The Working Group heard reports from subsistence fishers and the department concerning the status of the Kuskokwim River salmon runs. The chinook, chum and sockeye run strengths all appear below average based on the Bethel test fishery and subsistence reports.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 22 June to reevaluate salmon run strength.</p> <p><u>Working Group recommendation:</u> Agreed to meet again on 22 June.</p> <p><u>Actual outcome:</u> The Working Group met again on 22 June.</p>
22 Jun	<p>The Working Group appointed Raymond Nicholi to serve as Lower Kuskokwim Subsistence representative and elected Angela Morgan, Middle Kuskokwim Subsistence representative, to serve as a Co-Chair. Bethel test fishery indicates that the chinook, chum and sockeye runs are late or weak. Subsistence fishers report adequate chinook catches and increased catches of chum and sockeye in the lower river.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1, below Bethel, on 24 June.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1, below Bethel, on 24 June.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1, below Bethel, on 24 June.</p>
25 Jun	<p>The commercial CPUE of chinook and chum salmon on 24 June was about average for that date. The Bethel test fishery continues to indicate late or weak chinook, chum and sockeye runs.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 29 June.</p> <p><u>Working Group recommendation (#1):</u> Six-hour period in District W-1 on 29 June - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#2):</u> Working Group to meet again on 28 June.</p> <p><u>Actual outcome:</u> Working Group met again on 28 June.</p>

-continued-

Table 4. (page 3 of 6)

Date	Comment
28 Jun	<p>Chum salmon show an increasing trend in escapement and the Bethel test fishery. Subsistence fishers report adequate chinook abundance for this date</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 29 June.</p> <p><u>Working Group recommendation:</u> Six-hour period in Districts W-1 on 29 June.</p> <p><u>Actual outcome:</u> Six-hour period in Districts W-1 on 29 June.</p>
01 Jul	<p>The chinook, chum and sockeye runs appear to be late or weak based on commercial catches, Bethel test fishery and escapement counts.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 2 July.</p> <p><u>Working Group recommendation:</u> Working Group to meet again on 2 July.</p> <p><u>Actual outcome:</u> Working Group met again on 2 July.</p>
02 Jul	<p>Although below average for this date, chinook, chum and sockeye run strength continues to build. Subsistence fishers report that salmon abundance is adequate for this date.</p> <p><u>Dept. recommendation:</u> Four-hour period in District W-1 on 3 July.</p> <p><u>Working Group recommendation:</u> Four-hour period in District W-1 on 3 July.</p> <p><u>Actual outcome:</u> Four-hour period in District W-1 on 3 July.</p>
06 Jul	<p>Chum salmon run strength appears to be late and/or below average in strength based on commercial catches, Bethel test fish and escapement counts.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 8 July.</p> <p><u>Working Group recommendation:</u> Working Group meet again on 8 July.</p> <p><u>Actual outcome:</u> Working Group met again on 8 July.</p>
08 Jul	<p>The Working Group failed to achieve a quorum. Chum run strength continues to be below average based on commercial catches, Bethel test fishery and escapement counts.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 10 July.</p> <p><u>Working Group recommendation:</u> None – due to lack of a quorum. Agreed to meet again on 10 July.</p> <p><u>Actual outcome:</u> Working Group met again on 10 July.</p>

-continued-

Table 4. (page 4 of 6)

Date	Comment
10 Jul	<p>Alternates were appointed to three seats: Frank Charles (Kuskokwim Fishermen's Coop), Ilarioin Nicholi and John Owens (Lower Kuskokwim Subsistence) and Moxie Alexie (Upper River Subsistence). The chum run strength appears to be below average. Bethel test fish and Aniak River sonar are showing an increasing trend.</p> <p><u>Dept. recommendation:</u> Four-hour period in Districts W-1 on 11 July.</p> <p><u>Working Group recommendation:</u> Four-hour period in Districts W-1 on 11 July.</p> <p><u>Actual outcome:</u> Four-hour period in Districts W-1 on 11 July.</p>
13 Jul	<p>Chum run strength is too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again at call of Chair.</p> <p><u>Working Group recommendation:</u> Working Group meet again at call of Chair.</p> <p><u>Actual outcome:</u> Working Group met again on 21 July.</p>
21 Jul	<p>Chum run strength appears to be below average. Due to a conservative fishing schedule, escapement goals into the Aniak and Kogruklu Rivers are being achieved. Subsistence fishers report salmon run strength is adequate for their needs.</p> <p><u>Dept. recommendation:</u> Six-hour period in Districts W-1 on 22 July.</p> <p><u>Working Group recommendation:</u> Six-hour period in Districts W-1 on 22 July.</p> <p><u>Actual outcome:</u> Six-hour period in Districts W-1 on 22 July.</p>
24 Jul	<p>The salmon runs, appear to be large enough to meet escapement and subsistence needs and provide for a limited commercial harvest.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 27 July.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 on 27 July.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 27 July.</p>
29 Jul	<p>Chum escapement counts into the Aniak and Kogruklu Rivers indicate that escapement needs are being met. Coho catch exceeds chum catch during 27 July period and management emphasis switches to coho salmon. Coho run strength appears to be average for this date.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 1 August.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 on 1 August.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 1 August.</p>

-continued-



Table 4. (page 5 of 6)

Date	Comment
03 Aug	<p>The coho catch on 1 August was below average for that date. Other measures of coho run strength indicate that the run is near average for this date.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 6 August.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 on 6 August.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 6 August.</p> <p><u>Note:</u> On 4 August the department announced a six hour period in District W-2 on 6 August.</p>
08 Aug	<p>The Working Group failed to achieve a quorum. Coho run strength appears to be too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 10 August.</p> <p><u>Working Group recommendation:</u> None – due to lack of a quorum. Agreed to meet again on 10 August.</p> <p><u>Actual outcome:</u> Working Group met again on 10 August.</p>
10 Aug	<p>Information from the commercial fishery, escapement projects and the Bethel test fishery indicate that coho run strength is relatively weak for this date. Subsistence fishers report strong catches of coho in the lower river. At this time, a gap of at least four days between fishing periods is appropriate.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 (1300-1900) and District W-2 (1000-1600) on 12 August.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 (1300-1900) and District W-2 (1000-1600) on 11 August.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 (1300-1900) and District W-2 (1000-1600) on 11 August.</p>
13 Aug	<p>The coho commercial catch has been below average for the last three periods. Other measures of coho run strength indicate the run to be relatively weak for this date.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 16 August.</p> <p><u>Working Group recommendation:</u> Working Group meet again on 16 August.</p> <p><u>Actual outcome:</u> Working Group met again on 16 August.</p>
15 Aug	<p>Meeting called by the Chair. All run assessment reports indicate the coho run is relatively weak for this date but building in strength. Subsistence fishers report strong catches of coho in the lower river.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 17 August.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 on 17 August.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 17 August.</p>

-continued-

Table 4. (page 6 of 6)

Date	Comment
18 Aug	<p>All run assessment reports indicate the coho run is relatively weak for this date but continues to build in strength.</p> <p><u>Dept. recommendation:</u> Six-hour period in District W-1 on 22 August.</p> <p><u>Working Group recommendation:</u> Six-hour period in District W-1 on 22 August.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 22 August.</p>
24 Aug	<p>The coho run appears too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 27 August.</p> <p><u>Working Group recommendation:</u> Working Group meet again on 26 August.</p> <p><u>Actual outcome:</u> Working Group met again on 26 August.</p>
26 Aug	<p>The coho run continues to appear too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 28 August.</p> <p><u>Working Group recommendation (#1):</u> Close commercial fishing season on Kuskokwim River – Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#2):</u> Working Group meet again on 28 August.</p> <p><u>Actual outcome:</u> Working Group met again on 28 August.</p>
28 Aug	<p>Assuming late run timing, there is a reasonable possibility that the coho escapement goal at the Kogrukluk River weir will be met.</p> <p><u>Dept. recommendation:</u> Six hour period in District W-1 on 29 August and close the Kuskokwim River commercial fishery for the 1998 season.</p> <p><u>Working Group recommendation:</u> Six hour period in District W-1 on 29 August and close the Kuskokwim River commercial fishery for the 1998 season.</p> <p><u>Actual outcome:</u> Six-hour period in District W-1 on 29 August and closure of the Kuskokwim River commercial fishery for the 1998 season.</p>
10 Oct	<p>The Working Group reviewed data from inseason run assessment projects and heard a summary of the 1998 commercial fishery in the Kuskokwim River. Due to very weak chum and coho runs, fishing time was greatly reduced. Chum and coho harvests were 51% and 61% below their recent 10-year averages. Incidental chinook and sockeye catches were also below average. The escapement goal for chum was achieved at the Aniak River sonar while the coho escapement was 4% below the goal at the Kogrukluk River weir. Aerial counts of chinook were below their objective in 5 of 6 surveyed streams. The Working Group plans to meet again in March 1999 around the Camai Festival weekend.</p>

Table 5. Salmon processors and associated data, Kuskokwim Area, 1998.

Processor	Product	District
Arctic Salmon P.O. Box 578 Bethel, AK 99559	Frozen Salmon Fresh Salmon Salmon Roe	1, 2, 4 and 5
North Alaska Fisheries, Inc. P.O. Box 92737 Anchorage, AK 99509	Fresh Salmon Frozen Salmon Salmon Roe	1
Woodbine Alaska Fish Co. P.O. Box 218 Egegik, AK 99579	Frozen Salmon Canned Salmon Salmon Roe	1, 2, 4 and 5

Table 6. Commercial salmon harvest and fishing effort by period in Kuskokwim River Districts 1 and 2, and both districts combined, 1998.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
District 1													
1	6/24	6	338	6,413	3.16	9,043	4.46	32,467	16.01				
2	6/29	6	426	6,358	2.49	22,506	8.81	66,789	26.13				
3	7/3	4	445	2,277	1.28	15,985	8.98	51,471	28.92			1	0.00
4	7/11	4	417	1,127	0.68	10,172	6.10	29,407	17.63			23	0.01
5	7/22	6	346	460	0.22	1,538	0.74	15,663	7.54	4	0.00	3,633	1.75
6	7/27	6	370	356	0.16	932	0.42	7,500	3.38	11	0.00	18,497	8.33
7	8/1	6	425	156	0.06	235	0.09	2,787	1.09	19	0.01	26,791	10.51
8	8/6	6	496	88	0.03	295	0.10	1,020	0.34	10	0.00	45,128	15.16
9	8/11	6	464	67	0.02	95	0.03	388	0.14	16	0.01	58,426	20.99
10	8/17	6	439	34	0.01	45	0.02	122	0.05	11	0.00	34,640	13.15
11	8/22	6	382	19	0.01	53	0.02	67	0.03	14	0.01	18,936	8.26
12	8/29	6	154	1	0.00	7	0.01	17	0.02	7	0.01	4,093	4.43
Subtotal		68	615	17,356		60,906		207,698		92		210,168	
District 2													
1	8/6	6	3	3	0.17	-		111	6.17	0	0	2,112	117.33
2	8/11	6	NO HARVEST - NO DELIVERIES										
Subtotal		12	3	3		-		111		0		2,112	
Total													
Districts 1 & 2		607	607	17,359		60,906		207,809		92		212,280	

Table 7. Peak aerial survey salmon escapement estimates in Kuskokwim Area spawning tributaries by species, 1998<sup>a</sup>.

Location	Date	Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>					
Holitna River	na	na	na	na	na
Kipchuk River <sup>b</sup>	1-Aug	353	na	na	473
Salmon River (Aniak) <sup>b</sup>	1-Aug	491	na	na	1,973
Aniak River <sup>b</sup>	1-Aug	1,761	1,341	na	7,145
Holokuk River	na	na	na	na	na
Kasigluk River	na	na	na	na	na
Kisaralik River	23-Jul	457	0	na	150
Tuluksak River	23-Jul	230	0	na	610
Gagaryak River	na	na	na	na	na
Oskawalik River	na	na	na	na	na
Cheeneetnuk River	na	na	na	na	na
Salmon River (Pitka Fk)	na	na	na	na	na
Tatlawiksuk River	na	na	na	na	na
<u>KUSKOKWIM BAY:</u>					
Kinegnak River	31-Jul	18	2,200	1,600	1,240
Kanektok River	na	na	na	na	na
Goodnews River	24-Jul	731	7,732	na	3,619
Middle Fork					
Goodnews River	24-Jul	578	3,497	na	2,734
Kanektok River	na	na	na	na	na
Arolik River	na	na	na	na	na
Unulak River	31-Jul	12	1,400	369	130
Salmon River	31-Jul	na	1,200	na	880

<sup>a</sup> Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.

<sup>b</sup> Average of multiple surveys.



Table 8. Daily and cumulative estimates of fish passage at the Aniak River sonar site, 1998.

Date	Left Bank	Right Bank	Daily Count	Cumulative Count	Percent Passage
24-Jun	231	169	400	400	0
25-Jun	227	270	497	897	0
26-Jun	292	884	1,176	2,073	1
27-Jun	470	1,360	1,830	3,903	1
28-Jun	447	1,689	2,136	6,039	2
29-Jun	520	2,106	2,626	8,665	3
30-Jun	841	2,626	3,467	12,132	4
1-Jul	1,209	3,992	5,201	17,333	6
2-Jul	1,353	3,864	5,217	22,550	8
3-Jul	1,008	3,702	4,710	27,260	10
4-Jul	1,072	3,576	4,648	31,908	11
5-Jul	839	2,451	3,290	35,198	13
6-Jul	885	3,103	3,988	39,186	14
7-Jul	1,409	4,059	5,468	44,654	16
8-Jul	1,622	5,560	7,182	51,836	19
9-Jul	1,798	5,939	7,737	59,573	21
10-Jul <sup>a</sup>	1,609	5,370	6,979	66,552	24
11-Jul <sup>a</sup>	1,609	5,370	6,979	73,531	26
12-Jul <sup>a</sup>	1,609	5,370	6,979	80,509	29
13-Jul <sup>a</sup>	1,609	5,370	6,979	87,488	31
14-Jul <sup>a</sup>	1,609	5,370	6,979	94,467	34
15-Jul	1,410	4,509	5,919	100,386	36
16-Jul	1,604	5,473	7,077	107,463	38
17-Jul	2,021	7,773	9,794	117,257	42
18-Jul	5,163	10,363	15,526	132,783	48
19-Jul	5,466	9,485	14,951	147,734	53
20-Jul	7,151	8,035	15,186	162,920	58
21-Jul	7,560	8,849	16,409	179,329	64
22-Jul	7,997	8,274	16,271	195,600	70
23-Jul	7,120	7,151	14,271	209,871	75
24-Jul	6,285	6,195	12,480	222,351	80
25-Jul	5,572	3,466	9,038	231,389	83
26-Jul	5,244	3,003	8,247	239,636	86
27-Jul	6,177	3,473	9,650	249,286	89
28-Jul	4,842	3,392	8,234	257,520	92
29-Jul	4,263	2,892	7,155	264,675	95
30-Jul	4,465	3,361	7,826	272,501	98
31-Jul	4,616	2,313	6,929	279,430	100
TOTAL	109,222	170,208	279,430	279,430	

<sup>a</sup> Sonar not operational. Passage estimated using the average passage from 8-9 July & 15-16 July.

Table 9. Quinhagak, District 4 commercial salmon harvest and effort by period, 1998.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
1	6/15	12	64	2,314	3.01	99	0.13	189	0.25				
2	6/18	12	56	2,913	4.33	117	0.17	290	0.43				
3	6/22	12	69	3,642	4.40	762	0.92	1,531	1.85				
4	6/25	12	68	3,151	3.86	1,727	2.12	2,305	2.82				
5	6/29	12	57	1,919	2.81	2,681	3.92	5,269	7.70				
6	7/02	12	75	1,745	1.94	2,374	2.64	3,209	3.57				
7	7/06	12	78	1,670	1.78	3,400	3.63	5,134	5.49				
8	7/08	12	116	1,740	1.25	6,008	4.32	5,272	3.79				
9	7/10	12	112	956	0.71	4,622	3.44	5,555	4.13				
10	7/13	12	112	740	0.55	3,738	2.78	3,182	2.37			5	
11	7/15	12	75	482	0.54	4,214	4.68	3,811	4.23			0	
12	7/17	12	98	443	0.38	3,609	3.07	3,260	2.77			10	0.01
13	7/20	12	83	370	0.37	2,517	2.53	1,590	1.60			20	0.02
14	7/22	12	51	221	0.36	1,661	2.71	1,128	1.84			42	0.07
15	7/24	12	55	254	0.38	1,266	1.92	1,123	1.70			93	0.14
16	7/27	12	43	165	0.32	884	1.71	742	1.44			505	0.98
17	7/29	12	52	98	0.16	777	1.25	540	0.87			773	1.24
18	7/31	12	40	63	0.13	282	0.59	259	0.54	165	0.34	602	1.25
19	8/03	12	40	68	0.14	167	0.35	341	0.71	860	1.79	2,657	5.54
20	8/05	12	46	75	0.14	159	0.29	174	0.32	601	1.09	4,050	7.34
21	8/07	12	47	26	0.05	92	0.16	43	0.08	90	0.16	3,847	6.82
22	8/10	12	75	47	0.05	112	0.12	63	0.07	275	0.31	6,111	6.79
23	8/12	12	56	14	0.02	25	0.04	29	0.04	35	0.05	7,968	11.86
24	8/14	12	59	17	0.02	28	0.04	13	0.02	72	0.10	10,424	14.72
25	8/17	12	42	6	0.01	16	0.03	15	0.03	56	0.11	5,915	11.74
26				NO DELIVERIES DUE TO WEATHER									
27	8/21	12	57	5	0.01	22	0.03	20	0.03	24	0.04	9,161	13.39
28	8/24	12	44	3	0.01	2		0		2		6,074	11.50
29	8/26	12	51	4	0.01	5	0.01	5	0.01	25	0.04	2,534	4.14
30	8/28	12	36	2		4	0.01	2		7	0.02	1,917	4.44
31	8/31	12	29	0		1		1		1		3,929	11.29
32	9/02	12	34	1		6	0.01	0		0		5,148	12.62
33	9/04	12	31	4	0.01	5	0.01	0		4	0.01	4,442	11.94
34	9/07	12	25	0		0		0		0		3,956	13.19
Total		408	203	23,158		41,382		45,095		2,217		80,183	

Table 10. Goodnews Bay, District 5 commercial salmon harvest and effort by period, 1998.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
1	6/30	12	27	924	2.85	2,156	6.65	1,641	5.06				
2	7/03	12	26	1,065	3.41	2,541	8.14	2,485	7.96				
3	7/06	12	26	496	1.59	2,952	9.46	1,500	4.81				
4	7/08	12	27	302	0.93	2,652	8.19	1,894	5.85				
5	7/10	12	33	233	0.59	3,119	7.88	2,063	5.21				
6	7/13	12	37	126	0.28	2,785	6.27	1,423	3.20				
7	7/15	12	34	90	0.22	2,801	6.87	1,088	2.67			1	
8	7/17	12	34	76	0.19	1,598	3.92	680	1.67			0	
9	7/20	12	32	81	0.21	1,435	3.74	507	1.32			2	0.01
10	7/22	12	27	52	0.16	1,604	4.95	308	0.95			4	0.01
11	7/24	12	26	44	0.14	1,106	3.54	164	0.53			19	0.06
12	7/27	12	21	28	0.11	534	2.12	132	0.52			56	0.22
13	7/29	12	15	20	0.11	342	1.90	54	0.30			58	0.32
14	7/31	12	19	20	0.09	380	1.67	54	0.24			162	0.71
15	8/03	12	18	39	0.18	271	1.25	61	0.28			421	1.95
16	8/05	12	17	17	0.08	162	0.79	36	0.18	30	0.15	954	4.68
17	8/07	12	16	8	0.04	138	0.72	16	0.08	49	0.26	755	3.93
18	8/10	12	20	20	0.08	197	0.82	12	0.05	86	0.36	1,095	4.56
19	8/12	12	21	9	0.04	85	0.34	14	0.06	50	0.20	1,573	6.24
20	8/14	12	23	7	0.03	72	0.26	9	0.03	56	0.20	1,819	6.59
21	8/18	12	26	9	0.03	72	0.23	6	0.02	57	0.18	2,038	6.53
22	8/21	12	20	0		27	0.11	0		19	0.08	1,862	7.76
23	8/24	12	15	0		18	0.10	0		4	0.02	2,290	12.72
24	8/26	12	23	3	0.01	23	0.08	0		18	0.07	1,629	5.90
25	8/28	12	16	0		17	0.09	1	0.01	12	0.06	1,260	6.56
26	8/31	12	15	1	0.01	13	0.07	4	0.02	10	0.06	1,727	9.59
27	9/02	12	17	1		18	0.09	1		3	0.01	1,616	7.92
28	9/04	12	14	4	0.02	19	0.11	2	0.01	14	0.08	1,044	6.21
29	9/07	12	13	0		24	0.15	0		3	0.02	861	5.52
Total		348	50	3,675		27,161		14,155		411		21,246	

Table 11. Preliminary outlook for the 1999 Kuskokwim Area commercial salmon harvest (X 1,000 of fish).

Species	Management District						Kuskokwim Area Total	
	Districts 1 and 2		Distirct 4		District 5			
Chinook	10	to 40	15	to 30	1	to 3	26	to 73
Sockeye	35	to 90	50	to 70	25	to 40	110	to 200
Coho	100	to 500	40	to 80	15	to 30	155	to 610
Pink <sup>b</sup>	less than	1	less than	1	less than	1	1	to 2
Chum	200	to 500	40	to 70	10	to 20	250	to 590
TOTAL	345	to 1,131	145	to 251	51	to 94	542	to 1,475

<sup>a</sup> Kuskokwim River includes Districts 1 and 2.

<sup>b</sup> Outlook is based on historic catches in odd years only.

Table 12. Kuskokwim Area subsistence salmon project sampling summary, 1998.

COMMUNITY	TotalHH	CALENDARS		POSTCARDS		Household Surveys	Phone Surveys	Any Information	Subsist. Fished
		Mailed	Returned	Mailed	Returned				
Kipnuk	86	6	0	86	8	0	0	8	6
Kwigillingok	37	3	0	37	2	0	0	2	2
Kongiganak	66	40	4	0	0	49	0	65	43
NORTH KUSKOKWIM BAY	189	49	4	123	10	49	0	75	51
Tuntutuliak	69	52	10	1	1	54	0	66	52
Eek	69	46	17	1	1	50	0	67	39
Kasigluk	78	11	4	78	0	0	0	5	5
Nunapitchuk	95	78	18	1	1	63	0	94	65
Atmautluak	53	39	3	1	1	36	0	52	46
Napakiak	71	48	7	1	1	47	0	65	54
Napaskiak	73	59	7	2	2	43	0	71	56
Oscarville	14	9	1	0	0	10	0	14	11
Bethel	1,322	464	57	663	113	0	366	509	288
Kwethluk	133	103	23	5	5	95	0	130	99
Akiachak	110	88	12	4	4	72	0	108	83
Akiak	59	46	4	1	1	41	0	59	43
Tuluksak	73	54	8	2	2	51	0	71	62
LOWER KUSKOKWIM RIVER	2,219	1,097	171	760	132	562	366	1,311	903
Lower Kalskag	60	41	7	2	2	38	0	60	36
Upper Kalskag	52	28	6	1	1	38	0	52	33
Aniak	163	104	17	3	3	128	0	160	103
Chuathbaluk	28	25	2	0	0	22	0	28	20
MIDDLE KUSKOKWIM RIVER	303	198	32	6	6	226	0	300	192
Crooked Creek	31	24	4	1	1	24	0	31	22
Red Devil	18	13	4	1	1	11	0	18	14
Sleetmute	36	29	7	2	2	23	0	34	31
Stony River	16	13	2	15	3	0	0	5	5
Lime Village	15	6	0	0	0	13	0	15	10
McGrath	108	58	6	11	3	0	77	103	37
Takotna	19	2	0	0	0	18	0	19	1
Nikolai	28	14	2	1	1	24	0	28	16
Telida	2	0	0	0	0	0	1	1	
UPPER KUSKOKWIM RIVER	273	159	25	31	11	113	78	254	136
Quinhagak	131	99	12	3	3	83	0	126	93
Goodnews Bay	64	31	5	1	1	46	0	64	37
Platinum	14	4	0	14	1	0	0	1	1
SOUTH KUSKOKWIM BAY	209	134	17	18	5	129	0	191	131
Mekoryuk	81	13	0	81	17	0	0	17	16
Newtok	49	1	0	49	0	0	0	0	
Nightmute	25	1	0	25	0	0	0	0	
Toksook Bay	76	10	2	76	5	0	0	7	7
Tununak	70	1	0	70	3	0	0	3	2
Cheforak		0	0	30	1	0	0	1	1
BERING SEA COAST	301	26	2	331	26	0	0	28	26
KUSKOKWIM AREA TOTALS	3,495	1,663	251	1,269	190	1,079	444	2,159	1,439

Note: Blanks indicate no data are available.

Table 13. Kuskokwim Area subsistence salmon harvests, 1998.

COMMUNITY	HOUSEHOLDS		CHINOOK		CHUM		SOCKEYE		COHO	
	Total	Contacted	Reported	Estimated	Reported	Estimated	Reported	Estimated	Reported	Estimated
			Harvest	Total*	Harvest	Total*	Harvest	Total*	Harvest	Total*
Kipnuk	86	7	119	119	114	114	107	107	85	85
Kwigillingok	37	2	100	100	250	250	125	125	40	40
Kongiganak	<u>66</u>	<u>55</u>	<u>956</u>	<u>1,250</u>	<u>1,263</u>	<u>1,643</u>	<u>677</u>	<u>888</u>	<u>209</u>	<u>275</u>
N. KUSKOKWIM BAY	189	64	1,175	1,469	1,627	2,007	909	1,120	334	400
Tuntutuliak	69	57	3,266	4,008	3,075	3,774	1,039	1,275	763	935
Eek	69	64	1,985	2,131	733	787	356	382	285	306
Kasigluk	78	5	541	541	218	218	53	53	140	140
Nunapitchuk	95	81	3,983	4,934	4,333	5,389	1,832	2,250	349	427
Atmautluak	53	39	1,114	1,452	1,482	1,916	811	1,050	328	425
Napakiak	71	41	1,959	3,504	2,541	4,556	956	1,705	420	749
Napaskiak	73	53	3,699	5,452	2,871	4,227	1,096	1,617	366	540
Oscarville	14	8	446	981	191	420	131	288	1	2
Bethel	1,322	474	12,965	23,963	6,251	12,057	4,450	8,134	6,267	11,294
Kwethluk	133	107	6,235	7,940	3,745	4,786	3,162	4,036	1,353	1,731
Akiachak	110	85	4,942	6,507	1,874	2,467	2,012	2,654	362	477
Akiak	59	40	1,934	3,311	1,296	2,231	854	1,478	402	674
Tuluksak	<u>73</u>	<u>56</u>	<u>2,752</u>	<u>3,701</u>	<u>2,387</u>	<u>3,224</u>	<u>1,104</u>	<u>1,490</u>	<u>659</u>	<u>879</u>
LOWER KUSKOKWIM	2,219	1,110	45,821	68,425	30,997	46,052	17,856	26,412	11,695	18,579
Lower Kalskag	60	52	1,742	2,041	834	977	490	574	296	347
Upper Kalskag	52	45	1,104	1,244	437	487	217	245	727	812
Aniak	163	143	3,136	3,508	4,494	5,023	1,028	1,151	1,167	1,308
Chuathbaluk	<u>28</u>	<u>22</u>	<u>600</u>	<u>810</u>	<u>759</u>	<u>1,027</u>	<u>183</u>	<u>248</u>	<u>41</u>	<u>55</u>
MIDDLE KUSKOKWIM	303	262	6,582	7,603	6,524	7,514	1,918	2,218	2,231	2,522
Crooked Creek	31	29	710	772	2,356	2,561	659	716	361	392
Red Devil	18	13	174	262	363	565	249	346	275	425
Sleetmute	36	23	611	947	633	981	902	1,398	194	301
Stony River	16	4	445	445	897	897	433	433	429	429
Lime Village	15	15	241	241	964	964	2,782	2,782	776	776
McGrath	108	97	744	769	1,432	1,462	0		905	924
Takotna	19	19	2	2	15	15	0		3	3
Nikolai	28	28	330	330	519	519	0		113	113
Telida	<u>2</u>	<u>1</u>	<u>0</u>		<u>0</u>		<u>0</u>		<u>0</u>	
UPPER KUSKOKWIM	273	229	3,257	3,768	7,179	7,964	5,025	5,675	3,056	3,363
KUSKOKWIM RIVER	2,984	1,665	56,835	81,265	46,327	63,537	25,708	35,425	17,316	24,864
Quinhagak	131	102	3,054	4,041	1,098	1,448	1,131	1,490	1,287	1,702
Goodnews Bay	64	56	631	713	252	285	428	483	276	312
Platinum	<u>14</u>	<u>1</u>	<u>5</u>	<u>5</u>	<u>31</u>	<u>31</u>	<u>25</u>	<u>25</u>	<u>19</u>	<u>19</u>
S. KUSKOKWIM BAY	209	159	3,690	4,759	1,381	1,764	1,584	1,998	1,582	2,033
Mekoryuk	81	16	1	1	2,176	2,176	21	21	178	178
Newtok	49	0	0		0		0		0	
Nightmute	25	0	0		0		0		0	
Toksook Bay	76	6	48	48	171	171	101	101	97	97
Tununak	70	2	40	40	0		20	20	60	60
Chefornak	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>17</u>	<u>17</u>	<u>13</u>	<u>13</u>	<u>7</u>	<u>7</u>
BERING SEA COAST	302	25	91	91	2,364	2,364	155	155	342	342
KUSKOKWIM TOTALS	3,495	1,849	60,616	86,115	50,072	67,665	27,447	37,578	19,240	27,239

Note: If fewer than 30 households or less than 50% of the community were contacted, then reported harvest is used for estimated harvest.



Table 14. Gear types reported used for subsistence salmon fishing in the Kuskokwim Area during 1998.

Community	Number of Households Reporting Type of Subsistence Fishing Gear Used <sup>a</sup>					
	Setnet	Drift Net	Fish		Seine	Spear
			Wheel	Rod and Reel		
Kipnuk	2	5	0	0	0	0
Kwigillingok	0	2	0	0	0	0
Kongiganak	2	30	0	0	0	0
NORTH KUSKOKWIM BAY	4	37	0	0	0	0
Tuntutuliak	0	43	0	0	0	0
Eek	11	24	0	0	0	0
Nunapitchuk	5	42	0	0	0	0
Atmautluak	3	23	0	0	0	0
Napakiak	17	25	0	0	0	0
Napaskiak	10	34	0	0	0	0
Oscarville	3	7	0	0	0	0
Bethel	30	216	0	46	0	0
Kwethluk	28	47	0	3	0	0
Akiachak	18	45	0	0	0	0
Akiak	12	19	0	0	0	0
Tuluksak	16	34	0	3	0	0
LOWER KUSKOKWIM RIVER	153	559	0	52	0	0
Lower Kalskag	7	21	0	0	0	0
Upper Kalskag	8	19	0	2	0	0
Aniak	6	65	4	22	0	0
Chuathbaluk	4	14	0	1	0	0
MIDDLE KUSKOKWIM RIVER	25	119	4	25	0	0
Crooked Creek	4	13	3	0	0	0
Red Devil	4	3	0	3	0	0
Sleetmute	6	17	0	3	0	0
Stony River	3	0	0	1	0	0
Lime Village	5	1	2	4	0	0
McGrath	20	3	0	7	0	0
Takotna	1	0	0	0	0	0
Nikolai	10	0	0	8	0	0
UPPER KUSKOKWIM RIVER	53	37	5	26	0	0
Quinhagak	11	53	0	8	0	0
Goodnews Bay	6	17	0	4	0	0
Platinum	1	0	0	1	0	0
SOUTH KUSKOKWIM BAY	18	70	0	13	0	0
Mekoryuk	15	0	0	4	0	0
Toksook Bay	1	4	0	0	0	0
Tununak	2	1	0	0	0	0
Chefornak	0	1	0	0	0	0
BERING SEA COAST	18	6	0	4	0	0
KUSKOKWIM AREA TOTALS	271	828	9	120	0	0

a. Households using multiple gear types are listed for each gear type they reported. Communities where gear type information was not provided are not listed.

Table 15. Salmon reported retained from commercial catches for subsistence use in the Kuskokwim Area, 1998.

COMMUNITY	HOUSEHOLDS REPORTING		NUMBER OF SALMON RETAINED FROM COMMERCIAL CATCH FOR SUBSISTENCE USE			
	Commercial Fishing	Retained Commercial Caught Salmon for Subsistence	Chinook	Chum	Sockeye	Coho
Kongiganak	<u>25</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>30</u>
NORTH KUSKOKWIM BAY	25	1	0	0	0	30
Tuntutuliak	35	4	92	5	1	39
Eek	31	6	2	8	38	20
Nunapitchuk	36	6	1	64	4	21
Atmautluak	22	4	0	0	13	103
Napakiak	29	9	247	275	162	80
Napaskiak	20	4	0	0	18	7
Oscarville	7	4	50	0	1	1
Bethel	46	9	8	0	1	44
Kwethluk	55	12	5	5	22	42
Akiachak	51	8	37	23	11	25
Akiak	19	6	10	16	0	70
Tuluksak	<u>28</u>	<u>5</u>	<u>5</u>	<u>12</u>	<u>5</u>	<u>5</u>
LOWER KUSKOKWIM RIVER	379	77	457	408	276	457
Lower Kalskag	2	0	0	0	0	0
Upper Kalskag	5	0	0	0	0	0
Aniak	5	1	0	0	0	0
Chuathbaluk	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
MIDDLE KUSKOKWIM RIVER	12	1	0	0	0	0
Crooked Creek	0	0	0	0	0	0
Red Devil	0	0	0	0	0	0
Sleetmute	1	0	0	0	0	0
Stony River	0	0	0	0	0	0
Lime Village	0	0	0	0	0	0
McGrath	0	0	0	0	0	0
Takotna	0	0	0	0	0	0
Nikolai	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
UPPER KUSKOKWIM RIVER	1	0	0	0	0	0
KUSKOKWIM RIVER	417	79	457	408	276	487
Quinhagak	49	22	47	12	31	124
Goodnews Bay	<u>26</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
SOUTH KUSKOKWIM BAY	75	22	47	12	31	124
KUSKOKWIM AREA TOTALS	492	101	504	420	307	611

Note. Data are based upon household surveys and are not expanded. Communities not listed were not surveyed.

Table 16. Quality of subsistence salmon fishing in the Kuskokwim Area, 1998.

COMMUNITY	Number of Households Responding	Percent of households reporting quality of subsistence fishing							
		CHINOOK		CHUM		SCKEYE		COHO	
		Very Good or Average	Poor	Very Good or Average	Poor	Very Good or Average	Poor	Very Good or Average	Poor
Kipnuk	5	80	20	60	40	75	25	100	0
Kwigillingok	2	100	0	100	0	100	0	50	50
Kongiganak	<u>31</u>	<u>35</u>	<u>65</u>	<u>41</u>	<u>59</u>	<u>36</u>	<u>64</u>	<u>42</u>	<u>58</u>
N. KUSKOKWIM BAY	38	45	55	47	53	42	58	58	42
Tuntutuliak	39	69	31	67	33	70	30	72	28
Eek	29	72	28	39	61	43	57	60	40
Nunapitchuk	44	84	16	83	17	86	14	69	31
Atmaultuak	28	64	36	65	35	57	43	63	38
Napakiak	31	71	29	65	35	62	38	69	31
Napaskiak	34	79	21	64	36	72	28	80	20
Oscarville	5	100	0	100	0	100	0	50	50
Bethel	196	87	13	71	29	76	24	80	20
Kwethluk	57	82	18	80	20	87	13	83	17
Akiachak	53	87	13	68	32	79	21	74	26
Akiak	22	73	27	64	36	90	10	57	43
Tuluksak	<u>39</u>	<u>84</u>	<u>16</u>	<u>74</u>	<u>26</u>	<u>73</u>	<u>27</u>	<u>61</u>	<u>39</u>
L. KUSKOKWIM RIVER	577	81	19	70	30	75	25	75	25
Lower Kalskag	19	47	53	60	40	60	40	83	17
Upper Kalskag	22	68	32	50	50	64	36	58	42
Aniak	66	58	42	50	50	64	36	69	31
Chuathbaluk	<u>14</u>	<u>71</u>	<u>29</u>	<u>71</u>	<u>29</u>	<u>77</u>	<u>23</u>	<u>71</u>	<u>29</u>
M. KUSKOKWIM RIVER	121	60	40	56	44	66	34	69	31
Crooked Creek	17	69	31	71	29	69	31	86	14
Red Devil	6	33	67	33	67	40	60	60	40
Sleetmute	19	58	42	45	55	42	58	38	63
Stony River	3	0	100	67	33	0	100	33	67
Lime Village	8	50	50	25	75	43	57	50	50
McGrath	27	70	30	64	36			71	29
Takotna	1	0	100	0	100				
Nikolai	<u>15</u>	<u>60</u>	<u>40</u>	<u>80</u>	<u>20</u>			<u>67</u>	<u>33</u>
U. KUSKOKWIM RIVER	96	59	41	56	44	51	49	61	39
Quinhagak	44	82	18	75	25	73	27	87	13
Goodnews Bay	21	62	38	80	20	67	33	73	27
Platinum	<u>1</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>0</u>
S. KUSKOKWIM BAY	66	76	24	77	23	71	29	83	17
Mekoryuk	14	0	100	93	7	50	50	100	0
Toksook Bay	5	0	100	0	100	20	80	0	100
Tununak	2	50	50	0	100	50	50	100	0
Chefornak	<u>1</u>	<u>0</u>	<u>100</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>0</u>	<u>100</u>	<u>0</u>
B. SEA COAST	22	10	90	68	32	36	64	67	33
KUSKOKWIM TOTAL	920	73	27	67	33	70	30	73	27

Note: There were no responses to this survey question from Kasigluk, Telida, Newtok, and Nightmute.  
Blanks indicate no data are available.

Table 17. Kuskokwim area Pacific herring proportion of biomass by age class, 1998.

District	Age (years)												Total weight (st)
	2	3	4	5	6	7	8	9	10	11	12	13+	
<b>Commercial catch<sup>a</sup></b>													
Security Cove				0.4	2.8	8.9	16.4	21.8	22.9	15.6	5.4	5.9	1,012
Goodnews Bay			0.3	0.9	3.4	9.5	17.0	15.3	31.9	13.7	4.1	4.0	831
Cape Avinof				0.4	1.5	11.0	26.1	14.8	29.6	11.3	4.2	1.2	656
Nelson Island				0.3	0.7	13.7	18.0	19.9	29.0	12.3	3.6	2.6	1,250
Nunivak Island													-
All Districts			0.1	0.5	2.0	11.0	18.8	18.5	28.1	13.3	4.3	3.6	3,749
<b>Test Fishery<sup>b</sup></b>													
Security Cove		0.2	2.2	27.0	8.0	13.0	11.5	10.2	15.3	7.2	3.1	2.2	4,017
Goodnews Bay		0.4	2.5	17.0	5.5	14.6	13.4	10.6	18.4	9.9	3.7	4.1	4,064
Cape Avinof	0.1	0.7	3.0	24.1	6.2	14.4	17.5	8.9	16.8	3.9	2.4	2.0	4,287
Nelson Island		0.5	2.5	24.0	4.9	16.3	17.0	10.9	15.0	5.1	3.1	0.5	7,136
Nunivak Island		0.5	2.5	24.0	4.9	16.3	17.0	10.9	15.0	5.1	3.1	0.5	3,778
All Districts	0.0	0.5	2.5	23.3	5.8	15.1	15.5	10.4	16.0	6.1	3.1	1.7	23,282

a Commercial drift gill net

b ADF&G variable mesh gill net

Table 18. Kuskokwim area Pacific herring age frequency by district, 1998.

District	Age (years)												Sample Size	
	2	3	4	5	6	7	8	9	10	11	12	13+		
<b>Commercial catch<sup>a</sup></b>														
Security Cove				0.6	3.4	9.6	17.9	22.2	22.2	14.2	4.9	4.9	324	
Goodnews Bay			0.5	1.4	4.0	11.1	18.3	14.8	30.2	12.7	3.8	3.2	371	
Cape Avinof				0.7	1.8	11.9	27.1	14.8	28.5	10.5	3.6	1.1	277	
Nelson Island			0.3	0.5	0.8	15.3	18.6	19.9	27.9	11.5	3.0	2.2	176	
Nunivak Island														
All Districts			0.2	0.9	2.8	11.5	20.4	17.7	27.2	12.4	3.9	3.0	1,148	
<b>Test Fishery<sup>b</sup></b>														
Security Cove		-	0.6	5.0	45.1	10.3	13.0	7.8	4.7	8.6	2.9	1.5	0.6	667
Goodnews Bay			1.2	4.5	24.7	6.5	14.8	12.3	8.9	14.2	7.6	2.6	2.8	1,192
Cape Avinof	0.2	1.7	5.1	33.1	7.0	13.5	14.8	7.2	12.0	2.6	1.6	1.2	643	
Nelson Island	0.1	1.2	4.3	32.4	5.5	15.7	14.7	8.6	11.3	3.7	2.1	0.3	1,467	
Nunivak Island <sup>c</sup>			3.8	49.9	9.7	16.4	10.2	5.7	3.8	0.3	0.3	0.0	371	
All Districts	0.1	1.1	4.5	33.8	7.1	14.8	12.6	7.6	11.1	4.2	1.9	1.2	4,340	

a Commercial drift gill net

b ADF&G variable mesh gill net

c Sample obtained with purse seine gear.

Table 19. Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, Alaska, 1998.

<u>District</u>	<u>Period</u>	<u>Date</u>	<u>Time</u>	<u>Total hours</u>	<u>Harvest<sup>1</sup> (st)</u>
Security Cove	1	5/09	1530-2300	7.5	36.5
	2	5/10	1730-2300	6.0	17.8
	3	5/11	0600-1000	4.0	60.4
	4	5/11	1930-2330	4.0	477.0
	5	5/12	0800-1000	2.0	73.9
	6	5/12	2000-2200	2.0	71.7
	7	5/13	0930-1230	<u>3.0</u>	<u>274.4</u>
			Total	28.5	1011.7
Goodnews Bay	1	5/16	0800-1400	6.0	1.0
	2	5/17	0900-1500	6.0	5.0
	3	5/18	0930-1730	8.0	13.7
	4	5/19	0900-1700	8.0	88.6
	5	5/20	0000-0530	5.5	133.1
	6	5/20	1000-1800	8.0	176.3
	7	5/21	0100-0530	4.5	14.9
	8	5/21	1200-1900	7.0	157.7
	9	5/22	1300-2000	7.0	119.9
	10	5/23	1330-2000	6.5	47.0
	11	5/24	0200-0830	6.5	31.8
	12	5/25	1500-2100	<u>6.0</u>	<u>42.1</u>
			Total	79.0	831.1
Cape Avinof	1	5/29	1200-1600	4.0	23.6
	2	5/30	1030-1630	6.0	75.8
	3	5/31	0100-0400	3.0	14.8
	4	5/31	1200-1700	5.0	22.7
	5	6/01	1200-1800	6.0	113.5
	6	6/02	0100-0700	6.0	69.8
	7	6/02	1330-2030	7.0	126.9
	8	6/03	1400-2100	<u>7.0</u>	<u>208.5</u>
			Total	44.0	655.6
Nelson Island	1	5/23	0800-1000	2.0	3.8
	2	5/23	1900-2300	4.0	22.8
	3	5/24	1800-2300	6.0	75.4
	4	5/25	0800-1200	4.0	72.1
	5	5/25-5/26	1830-0030	6.0	156.0
	6	5/26	0900-1300	4.0	10.6
	7	5/26-5/27	1900-0100	6.0	89.8
	8	5/27	1000-1430	4.5	38.2
	9	5/27-5/28	1930-0130	6.0	226.9
	10	5/28	1100-1630	5.5	26.0
	11	5/28-5/29	2300-0500	6.0	164.7
	12	5/29	1300-1800	5.0	145.7
	13	5/30	0000-0500	<u>5.0</u>	<u>218.0</u>
			Total	76.0	1250.1
Nunivak Island	1	5/21	1300-1900	<u>6.0</u>	<u>2.2</u>
			Total	6.0	2.2
Nunivak Island Aerial Calibration Study					200.0

<sup>1</sup> Report includes estimated hopper weights for actual de-watered weights as reported by processor on fish tickets and in final catch reports. Hopper weight was estimated by adding 10%.



Table 20. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, Alaska, 1999.

1999 Projection <sup>a</sup>				
<u>District</u>	<u>Biomass (st)</u>	<u>Threshold (st)<sup>b</sup></u>	<u>Harvest (st)</u>	<u>Exploitation Rate (%)</u>
Security Cove	3,060	1,200	612	20
Goodnews Bay	3,009	1,200	602	20
Cape Avinof	3,555	500	533	15
Nelson Island	5,826	3,000	965	17
Nunivak Island	<u>3,319</u>	1,500	<u>664</u>	20
Total	18,769		3,376	

a Preseason projection. Projection may be adjusted based on inseason biomass estimates.

b Threshold biomass needed to allow a commercial fishery from 5 AAC 27.060 Bering Sea Herring Fishery Management Plan.

Table 21. 1998 commercial salmon harvest and effort by period for statistical area 335-11.

Year	Date	Number of Permits	Hours Fished	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1990	Jun 20	134	6	2,580	2,021	5,353		
	Jun 25	102	6	1,453	2,719	6,986		
	Jun 29	92	6	694	975	5,116		
	Jul 05	66	6	518	1,509	11,354		
	Jul 09	91	6	455	721	12,405	5	
	Jul 14	93	8	254	868	11,053	17	43
	Aug 01	98	6	36	50	1,166	330	3,653
	Aug 06	106	6	170	34	599	193	20,588
	Aug 10	123	6	22	27	244	73	11,089
	Aug 13	95	6	6	27	67	26	16,094
	Aug 16	100	9	6	14	60	28	7,243
	Aug 20	70	6		15	27	18	3,259
	Aug 27	35	6	1	8	1	12	1,835
Total		743	83	6,195	8,988	54,431	702	63,804
1991	Jun 20	88	6	1,392	2,619	3,340		
	Jun 24	86	6	1,633	4,867	9,865		
	Jul 01	94	6	576	5,572	10,195		
	Jul 06	102	6	264	2,387	6,031		
	Jul 13	84	6	150	894	11,289	12	4
	Jul 18	89	6	66	396	7,990		218
	Jul 22	65	6	30	46	3,973		310
	Jul 25	69	8	40	51	4,012	66	1,543
	Jul 29	91	8	12	40	4,050	19	7,661
	Aug 01	126	6	12	24	957	16	11,091
	Aug 05	149	8	11	19	927	19	12,868
	Aug 08	147	8	10	13	562	14	24,661
	Aug 12	150	8	7	13	278	34	16,355
	Aug 14	107	8	6	10	139	13	14,426
	Aug 19	82	6	7	4	21	1	6,422
	Aug 26	68	8	2	6	7		3,006
Total		252	110	4,218	16,961	63,636	194	98,565
1992	Jun 18	130	8	2,449	3,388	9,256		
	Jun 22	146	8	2,389	5,669	17,363		
	Jun 25	135	8	1,109	3,430	11,135	5	
	Jun 29	109	6	981	4,040	16,734		
	Jul 06	96	8	640	1,559	20,850	540	
	Aug 03	146	8	81	32	492	2,098	26,666
	Aug 06	124	6	21	30	243	219	20,674
	Aug 11	151	6	26	35	57	15	25,099
	Aug 14	130	6	23	28	48	26	17,348
	Aug 17	116	6	15	19	19	6	10,943
	Aug 20	104	6	6	5	2		10,691
	Aug 24	93	6	5	12	6		5,147
	Aug 27	66	6	6	3	6		6,072
	Aug 31	57	6	3	3	4		1,943
Total		271	94	7,754	18,253	76,215	2,909	124,583

-Continued-

Table 21. (page 2 of 3)

Year	Date	Number of Permits	Hours Fished	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1993	Jun 25	183	8	2,073	9,803	10,844		
	Jul 31	150	6	44	78	867		11,538
	Aug 04	163	6	10	32	264		16,044
	Aug 06	119	8	21	43	120		16,922
	Aug 09	112	6	13	32	41		10,192
	Aug 14	163	6	18	22	67	5	27,176
	Aug 17	130	6	9	17	38		19,712
	Aug 21	125	6	2	5	6		5,531
	Aug 25	83	6	3	9	12		2,932
	Aug 28	71	6	5	13	12	2	3,265
	Sept 01	24	6	0	0	1		644
Total		278	70	2,198	10,054	12,272	7	113,956
1994	Jun 24	116	8	1,306	6,720	13,224		
	Jul 14	67	4	82	493	4,691	581	382
	Jul 19	85	6	64	270	4,428	1,193	1,279
	Jul 23	80	6	38	274	1,927	1,211	3,109
	Jul 26	109	6	31	183	1,994	2,276	5,314
	Jul 29	105	6	24	47	941	1,294	7,498
	Aug 04	120	6	15	27	378	972	10,214
	Aug 09	67	6	6	4	44	166	9,080
	Aug 12	113	8	11	16	74	101	13,019
	Aug 15	109	8	5	18	74	187	12,159
	Aug 18	96	8	1	8	24	55	7,944
	Aug 22	88	8	4	8	13	56	9,971
	Aug 25	54	8	0	2	3	20	2,850
	Aug 27	62	6	1	0	2	6	2,709
	Aug 30	45	6	1	0	6	13	1,422
	Sept 02	20	6	0	1	0		478
Total		231	106	1,589	8,071	27,823	8,131	87,428
1995	Jun 22	120	4	1,794	1,225	8,912		
	Jun 26	117	4	1,242	4,950	16,819		
	Jun 29	124	4	752	4,383	18,410		
	Jul 03	117	4	453	3,199	17,751		
	Jul 06	103	4	238	1,530	15,670		
	Jul 10	96	4	111	927	14,650	1	
	Jul 14	95	4	153	1,574	7,637		62
	Jul 18	83	6	68	455	8,539		170
	Jul 21	55	4	33	130	2,642		443
	Aug 04	88	6	21	77	82	3	10,613
	Aug 08	120	6	10	87	94	3	10,166
	Aug 12	115	6	7	269	106	2	14,836
	Aug 16	91	6	7	67	16	6	6,867
	Aug 19	100	6	7	55	22	1	6,886
	Aug 22	89	6	7	76	22	1	7,332
	Aug 26	85	6	11	77	19	6	3,905
	Aug 29	43	6	3	26	10	1	1,269
	Sept 01	23	6	0	22	3		872
Total		260	92	4,917	19,129	111,404	24	63,421

-Continued-

Table 21. (page 3 of 3)

Year	Date	Number of Permits	Hours Fished	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1996	Jun 17	No Tenders / No Deliveries						
	Jun 20	1	2	4	90	120		0
	Jun 24	No Tenders / No Deliveries						
	Jul 02	10	2	39	160	958		0
	Jul 05	20	2	37	481	1,432		0
	Jul 08	17	2	24	353	932		1
	Jul 12	15	2	12	133	1,937		200
	Jul 16	6	2	4	35	115		142
	Jul 19	27	3	11	39	843		1,959
	Jul 22	71	6	20	185	1,771		12,764
	Jul 25	90	8	22	74	406	118	7,838
	Jul 29	78	6	19	75	900	125	14,135
	Jul 31	35	6	4	9	63		5,886
	Aug 03	124	6	10	67	89	1	18,114
	Aug 07	116	6	9	27	38		15,346
	Aug 10	64	6	6	7	7		6,166
	Aug 13	65	6	2	27	20		5,003
	Aug 16	95	6	6	42	8		6,261
	Aug 20	77	6	4	41	8		3,589
	Aug 23	63	6	3	6	4		2,664
	Aug 26	15	6	1	0	0		540
Total		241	89.0	237	1,851	9,651	244	100,608
1997	Jun 23	81	6	2,171	7,745	4,540		
	Jul 31	108	6	44	118	559		4,460
	Aug 06	92	6	29	126	120		4,350
	Aug 12	73	6	5	40	36		4,095
	Aug 18	65	6	8	43	24		5,327
Total		158	30.0	2,257	8,072	5,279	0	18,232
1998	Jun 24	85	6	1,168	3,286	6,721		
	Jun 29	88	6	548	6,389	15,518		
	Jul 3	72	4	270	2,194	6,113		
	Jul 11	55	4	211	685	3,542		10
	Jul 22	51	6	117	395	801		561
	Jul 27	97	6	71	425	1,331		4,647
	Aug 1	104	6	37	67	490	6	6,221
	Aug 6	84	6	15	42	56	3	6,970
	Aug 11	86	6	14	32	57	8	8,562
	Aug 17	60	6	0	12	6	8	2,063
	Aug 22	51	6	5	5	7	9	2,256
	Aug 29	22	6	1	4	6	7	735
Total		215	68	2,457	13,536	34,648	41	32,025

Table 22. 1998 commercial salmon harvest and effort by period for statistical area 335-12.

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1990	Jun 20	496	14,110	8,297	24,953		
	Jun 25	341	7,342	13,289	32,077		
	Jun 29	337	3,815	7,660	35,828		
	Jul 05	316	1,589	3,954	40,720	2	
	Jul 09	294	1,201	3,172	43,347	4	
	Jul 14	313	864	1,471	40,580	10	15
	Aug 01	337	129	130	3,663	1,058	14,536
	Aug 06	350	71	68	1,979	611	28,431
	Aug 10	301	40	32	612	184	17,860
	Aug 13	322	16	15	260	68	83,038
	Aug 16	293	8	12	77	51	21,734
	Aug 20	284	8	11	44	17	25,003
	Aug 27	253	2	2	8	5	6,210
Total		649	29,195	38,113	224,148	2,010	196,827
1991	Jun 20	513	12,421	17,113	9,926		
	Jun 24	340	6,117	9,162	13,431		
	Jul 01	351	2,926	11,040	27,070		
	Jul 06	274	745	8,972	17,671	1	
	Jul 13	291	412	2,198	20,744	9	12
	Jul 18	250	135	1,612	32,764	9	531
	Jul 22	231	57	302	13,985	17	1,065
	Jul 25	241	68	166	10,015	18	1,988
	Jul 29	277	68	78	10,749	14	22,819
	Aug 01	294	93	35	4,874	11	14,836
	Aug 05	277	16	32	2,075	6	21,918
	Aug 08	268	9	15	1,284	8	25,824
	Aug 12	294	16	13	654	4	61,098
	Aug 14	275	7	7	260	2	22,589
	Aug 19	272	10	10	98	2	25,540
	Aug 26	233	4	5	51	2	19,600
Total		596	23,104	50,760	165,651	103	217,820
1992	Jun 18	437	7,307	5,120	23,439		
	Jun 22	313	7,160	9,668	42,391	14	
	Jun 25	288	3,537	8,323	26,332	1	
	Jun 29	291	3,645	10,957	45,137	38	
	Jul 06	294	1,192	2,677	38,783	151	1
	Aug 03	292	125	75	1,578	2,670	29,341
	Aug 06	271	54	23	522	249	24,520
	Aug 11	296	64	25	299		81,586
	Aug 14	274	27	24	98		31,051
	Aug 17	280	25	29	62		42,555
	Aug 20	267	14	9	30		35,619
	Aug 24	248	12	4	6		9,522
	Aug 27	223	14	2	11	1	13,262
	Aug 31	154	1	2	5		4,443
Total		566	23,177	36,936	178,693	3,124	271,900

-Continued-

Table 22. (page 2 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1993	Jun 25	441	6,111	16,560	23,279		
	Jul 31	286	59	60	1,558	11	25,420
	Aug 04	258	41	93	929	6	53,888
	Aug 06	279	31	28	535	9	37,491
	Aug 09	308	30	38	203	2	23,634
	Aug 14	287	16	12	115	6	34,600
	Aug 17	242	6	7	39	5	25,986
	Aug 21	244	3	14	30	1	13,822
	Aug 25	148	1	3	4		2,420
	Aug 28	128	3	5	11		3,406
	Sept 01	96	1	1	9	3	5,452
Total		566	6,302	16,821	26,712	43	226,119
1994	Jun 24	449	12,915	32,238	73,990		
	Jul 14	270	253	1,186	21,138	608	280
	Jul 19	246	107	566	30,904	1,398	2,553
	Jul 23	244	114	184	21,471	2,828	11,974
	Jul 26	265	86	119	8,168	3,449	17,595
	Jul 29	279	114	72	4,358	3,681	27,548
	Aug 04	299	40	39	1,716	2,148	26,966
	Aug 09	263	8	58	627	751	58,112
	Aug 12	264	12	20	287	224	44,381
	Aug 15	270	9	8	168	183	15,883
	Aug 18	262	11	5	122	129	31,199
	Aug 22	256	4	6	61	112	15,696
	Aug 25	214	4	4	47	65	16,031
	Aug 27	182	0	4	17	21	6,130
	Aug 30	218	1	2	10	8	6,770
	Sept 02	137	0	1	3	7	2,011
Total		583	13,678	34,512	163,087	15,612	283,129
1995	Jun 22	449	5,101	3,195	40,245		
	Jun 26	270	4,196	5,882	38,893		
	Jun 29	257	1,865	6,668	45,700		
	Jul 03	152	637	3,324	30,563	2	
	Jul 06	196	439	4,866	33,073		
	Jul 10	188	267	1,447	30,094	1	15
	Jul 14	203	195	786	18,045	3	112
	Jul 18	109	105	457	11,341	7	236
	Jul 21	171	56	173	7,988	5	436
	Aug 04	59	14	18	259		14,545
	Aug 08	265	35	66	473	5	41,623
	Aug 12	280	14	58	202	5	48,136
	Aug 16	251	14	23	76	5	18,086
	Aug 19	242	11	20	61	5	16,437
	Aug 22	213	2	21	83	5	17,312
	Aug 26	191	9	30	48	4	9,299
	Aug 29	152	5	14	15	6	8,186
	Sept 01	79	1	7	7	3	1,108
Total		561	12,966	27,055	257,166	56	175,531

-Continued-



Table 22. (page 3 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1996	Jun 17	245	2,045	1,850	11,560		
	Jun 20	185	1,014	4,205	18,678		
	Jun 24	129	248	1,762	10,233		
	Jul 02	122	259	2,058	9,868		
	Jul 05	86	85	882	8,460		1
	Jul 08	102	63	2,800	11,366		14
	Jul 12	127	103	1,555	15,561		1,018
	Jul 16	122	46	248	9,278		3,214
	Jul 19	141	61	132	6,491		7,046
	Jul 22	207	56	97	7,807	165	23,722
	Jul 25	254	44	76	4,720	140	61,435
	Jul 29	247	35	66	1,474	329	68,635
	Jul 31	250	24	49	834	212	52,739
	Aug 03	212	18	37	336	23	44,710
	Aug 07	195	19	27	319	34	36,850
	Aug 10	240	16	34	198	32	28,714
	Aug 13	224	13	33	144	21	30,841
	Aug 16	196	3	24	131	3	20,779
	Aug 20	150	7	19	22	2	7,242
	Aug 23	104	1	9	9	5	3,960
	Aug 26	72	1	6	7		2,410
Total		486	4,161	15,969	117,496	966	393,330
1997	Jun 23	274	7,852	13,473	8,550		
	Jul 31	322	97	234	1,501		10,503
	Aug 06	280	62	80	662	2	15,689
	Aug 12	261	33	40	269		28,857
	Aug 18	234	19	18	28		6,622
Total		449	8,063	13,845	11,010	2	61,671
1998	Jun 24	253	5,245	5,757	25,746		
	Jun 29	151	2,118	6,060	24,617		
	Jul 3	230	971	6,958	28,029		1
	Jul 11	235	549	5,356	16,917		8
	Jul 22	165	184	355	5,510		1,822
	Jul 27	176	133	229	3,239		9,459
	Aug 1	208	80	76	1,172	9	14,304
	Aug 6	212	24	31	324	3	11,901
	Aug 11	196	28	32	151	6	19,207
	Aug 17	150	10	11	26	1	7,056
	Aug 22	123	4	16	19	3	5,131
	Aug 29	48	0	1	1	0	765
Total		423	9,346	24,882	105,751	22	69,654

Table 23. 1998 commercial salmon harvest and effort by period for statistical area 335-13.

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1990	Jun 20						
	Jun 25	126	5,152	7,408	10,387		
	Jun 29	153	3,477	6,016	20,099		
	Jul 05	153	1,305	2,580	23,669	1	
	Jul 09	167	903	2,845	24,575	2	
	Jul 14	171	769	1,547	19,037	5	12
	Aug 01	119	53	77	1,984	182	3,736
	Aug 06	125	52	10	1,293	166	8,923
	Aug 10	171	26	5	348	74	18,171
	Aug 13	170	14	5	173	16	12,956
	Aug 16	201	9	2	96	34	27,544
	Aug 20	181	2	7	37	2	17,669
	Aug 27	185		6	13	4	4,917
Total		328	11,762	20,508	101,711	486	93,928
1991	Jun 20						
	Jun 24	123	3,101	2,724	3,522		
	Jul 01	124	1,535	4,535	6,816		
	Jul 06	141	597	7,017	8,479		
	Jul 13	126	221	1,604	10,841		
	Jul 18	151	177	2,143	24,301		198
	Jul 22	174	75	1,391	17,267	2	984
	Jul 25	146	43	282	9,149		903
	Jul 29	109	37	129	5,042		4,849
	Aug 01	128	14	33	3,903	2	8,114
	Aug 05	142	15	6	1,369		12,005
	Aug 08	154	9	7	780	2	16,259
	Aug 12	158	9	1	335	1	26,481
	Aug 14	157	4	5	117		14,882
	Aug 19	172	3	6	112	1	17,678
	Aug 26	153		1	30		14,982
Total		320	5,840	19,884	92,063	8	117,335
1992	Jun 18						
	Jun 22	106	3,297	5,761	6,634		
	Jun 25	143	2,858	6,679	9,439		
	Jun 29	149	1,948	8,065	12,160	1	
	Jul 06	141	777	2,240	14,408	28	1
	Aug 03	128	56	18	676	859	13,315
	Aug 06	138	27	38	315	36	8,729
	Aug 11	174	58	14	224	3	56,448
	Aug 14	168	11	3	46		25,578
	Aug 17	143	6	1	31		18,169
	Aug 20	149	12	3	20		17,900
	Aug 24	144	7	3	9		7,102
	Aug 27	138	4	1	9		6,284
	Aug 31	117	3	3	8		5,663
Total		276	9,064	22,829	43,979	927	159,189

-Continued-

Table 23. (page 2 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1993	Jun 25						
	Jul 31	146	50	66	950	6	13,815
	Aug 04	186	27	13	445	3	51,261
	Aug 06	185	27	12	296		27,064
	Aug 09	158	18	4	73	1	12,821
	Aug 14	141	6	5	69		10,512
	Aug 17	192	11	7	38	1	26,249
	Aug 21	150	3	5	20		16,709
	Aug 25	146	0	1	8		3,237
	Aug 28	148	4	1	5		5,061
	Sept 01	116	2	2	8		4,479
Total		306	148	116	1,912	11	171,208
1994	Jun 24						
	Jul 14	128	163	1,454	11,546	88	79
	Jul 19	138	153	2,764	18,368	894	2,625
	Jul 23	148	127	507	11,053	1,465	7,978
	Jul 26	142	91	62	8,268	1,346	13,847
	Jul 29	148	41	32	4,337	789	12,660
	Aug 04	147	28	20	1,185	543	26,272
	Aug 09	159	6	6	208	249	40,824
	Aug 12	187	7	6	202	113	40,117
	Aug 15	169	5	7	45	32	14,199
	Aug 18	186	6	3	37	50	31,410
	Aug 22	163	2	1	18	19	10,675
	Aug 25	156	3	1	9	24	15,199
	Aug 27	167	2	0	8	12	10,215
	Aug 30						
	Sept 02						
Total		327	634	4,863	55,284	5,624	226,100
1995	Jun 22						
	Jun 26	193	3,970	8,526	36,766		
	Jun 29	151	1,848	5,351	14,574		
	Jul 03	153	1,103	6,341	26,526		
	Jul 06	140	596	5,499	21,883		
	Jul 10	163	371	1,975	27,758		6
	Jul 14	87	126	552	9,049	2	42
	Jul 18	96	114	358	8,770	2	206
	Jul 21	100	88	217	6,679	1	307
	Aug 04	82	26	28	605	2	22,165
	Aug 08	194	40	181	393		36,567
	Aug 12	184	19	22	451	1	29,290
	Aug 16	199	17	50	74	1	29,628
	Aug 19	160	5	8	34	2	12,069
	Aug 22	148	4	9	35	1	15,120
	Aug 26	149	3	9	14		10,316
	Aug 29	120	5	3	6	1	6,154
	Sept 01	102	1	2	2		2,893
Total		331	8,336	29,131	153,619	13	164,763

-Continued-

Table 23. (3 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1996	Jun 17						
	Jun 20	81	856	1,817	7,292		
	Jun 24	97	330	2,284	7,581		
	Jul 02	75	189	1,358	8,239		
	Jul 05	74	141	1,642	5,648		1
	Jul 08	75	76	3,181	4,362		6
	Jul 12	75	83	1,391	6,748		311
	Jul 16	58	27	231	3,860		1,031
	Jul 19	78	64	64	3,796		4,093
	Jul 22	125	94	311	4,246	71	12,283
	Jul 25	135	40	73	2,742	99	34,446
	Jul 29	185	40	43	925	126	52,950
	Jul 31	139	18	30	543	51	43,749
	Aug 03	163	28	25	600	19	49,738
	Aug 07	177	13	17	185	13	31,440
	Aug 10	168	22	14	571	7	37,493
	Aug 13	123	8	19	97	6	20,904
	Aug 16	178	17	76	65	1	18,405
	Aug 20	112	5	19	17	10	8,615
	Aug 23	84	4	7	10	5	3,770
	Aug 26	101	9	17	6	3	4,516
Total		309	2,064	12,619	57,533	411	323,751
1997	Jun 23						
	Jul 31						
	Aug 06	105	37	17	201		8,856
	Aug 12	132	17	38	49		13,518
	Aug 18	116	39	4	5		4,421
Total		180	93	59	255	0	26,795
1998	Jun 24						
	Jun 29	181	3,288	9,084	23,601		
	Jul 3	117	842	5,376	13,388		
	Jul 11	104	318	3,443	6,059		4
	Jul 22	72	75	521	3,756	4	567
	Jul 27	52	84	43	1,186	11	2,805
	Aug 1	69	18	35	417	4	2,379
	Aug 6	143	43	214	308	4	16,759
	Aug 11	119	20	19	93	2	15,426
	Aug 17	160	19	14	67	2	15,155
	Aug 22	143	6	22	30	2	6,063
	Aug 29	60	0	2	3	0	1,506
Total		316	4,713	18,773	48,908	29	60,664

Table 24. 1998 commercial salmon harvest and effort by period for statistical area 335-14.

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1990	Jun 20						
	Jun 25	54	2,084	3,608	9,494		
	Jun 29	69	1,442	4,123	13,868		
	Jul 05	59	659	2,716	11,092		
	Jul 09	45	245	2,019	11,084		
	Jul 14	52	240	1,581	9,133		
	Aug 01	29	34	276	2,252	16	1,624
	Aug 06	50	13	21	726	6	3,508
	Aug 10	61	6	2	65	4	11,131
	Aug 13	56	2	1	9	1	3,356
	Aug 16	61	5	1	6		12,084
	Aug 20	61	1	1	5	1	5,907
	Aug 27	63			3		3,068
Total		143	4,731	14,349	57,737	28	40,678
1991	Jun 20						
	Jun 24	71	1,761	2,509	3,814		
	Jul 01	63	929	3,281	6,040		
	Jul 06	72	496	5,843	7,879		
	Jul 13	72	121	1,762	9,678		
	Jul 18	78	74	977	13,742		30
	Jul 22	74	71	1,346	14,563		296
	Jul 25	77	35	1,027	6,907	2	437
	Jul 29	59	17	485	4,185	16	1,812
	Aug 01	56	6	532	3,364	1	4,243
	Aug 05	75	14	39	1,720	7	9,471
	Aug 08	65	5	5	568		5,293
	Aug 12	64	10	4	319	1	10,647
	Aug 14	63	1	1	118		6,496
	Aug 19	64	4	4	82		7,724
	Aug 26	60			5		6,076
Total		170	3,544	17,815	72,984	27	52,525
1992	Jun 18						
	Jun 22	58	1,732	3,919	8,041		
	Jun 25	72	1,480	3,490	8,208		
	Jun 29	59	749	3,020	6,182		
	Jul 06	60	641	1,486	10,155		
	Aug 03	54	44	12	1,323	486	8,911
	Aug 06	57	14	7	239		3,583
	Aug 11	59	9	2	84		18,772
	Aug 14	63	2	0	4		13,982
	Aug 17	57	1	0	10		7,690
	Aug 20	59	4	0	1		9,153
	Aug 24	65	3	0	2		6,298
	Aug 27	54	2	0	0		2,620
	Aug 31	46	1	0	0		4,913
Total		116	4,682	11,936	34,249	486	75,922

-Continued-

Table 24. (page 2 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1993	Jun 25						
	Jul 31	46	19	6	758		5,334
	Aug 04	60	20	3	442		16,456
	Aug 06	57	9	1	445	1	9,923
	Aug 09	50	4	1	129	1	8,170
	Aug 14	55	6	0	36		7,938
	Aug 17	58	4	0	4	1	10,749
	Aug 21	74	1	1	2		11,035
	Aug 25	65	2	0	4		1,967
	Aug 28	40	0	0	2		1,860
	Sept 01	38	1	0	0		1,615
Total		100	66	12	1,822	3	75,047
1994	Jun 24						
	Jul 14	53	80	758	6,210	154	79
	Jul 19	35	117	875	6,404	230	570
	Jul 23	35	34	160	3,698	341	1,152
	Jul 26	37	17	107	4,030	343	3,145
	Jul 29	45	25	8	1,616	146	4,384
	Aug 04	42	5	1	704	172	12,062
	Aug 09	68	9	2	274	56	21,554
	Aug 12	61	4	5	214	59	20,236
	Aug 15	50	3	0	34	10	5,661
	Aug 18	59	2	0	29	31	12,197
	Aug 22	50	2	0	12	14	7,712
	Aug 25	33	2	0	4	3	3,515
	Aug 27	35	0	0	3	4	1,472
	Aug 30						
	Sept 02						
Total		120	300	1,916	23,232	1,563	93,739
1995	Jun 22						
	Jun 26	4	63	91	674		
	Jun 29	33	488	1,786	4,896		
	Jul 03	55	654	4,214	14,587		
	Jul 06	45	248	2,870	10,620		
	Jul 10	48	157	2,751	13,866		
	Jul 14	50	72	1,307	8,406		5
	Jul 18	50	79	1,212	8,644		59
	Jul 21	42	25	420	3,730		86
	Aug 04	6	3	0	126		1,342
	Aug 08	36	10	29	269		10,192
	Aug 12	43	10	10	140		10,159
	Aug 16	52	14	7	42		11,132
	Aug 19	55	5	4	16		5,665
	Aug 22	47	3	7	17		4,214
	Aug 26	52	2	1	20		5,609
	Aug 29	40	2	2	8		2,181
	Sept 01	15	0	0	0		910
Total		97	1,835	14,711	66,061	0	51,554

-Continued-



Table 24. (page 3 of 3)

Year	Date	Number of Permits	King Salmon	Sockeye Salmon	Chum Salmon	Pink Salmon	Coho Salmon
1996	Jun 17						
	Jun 20	16	172	311	1,352		
	Jun 24	14	88	374	1,624		
	Jul 02	17	58	386	1,850		
	Jul 05	14	53	476	2,111		
	Jul 08	17	15	461	2,141		3
	Jul 12	20	32	702	2,222		79
	Jul 16	12	10	88	1,939		288
	Jul 19	21	28	63	2,260		1,648
	Jul 22	14	13	46	680		1,674
	Jul 25	18	18	33	1,156		9,918
	Jul 29	23	3	2	529		9,053
	Jul 31	51	6	4	101		20,572
	Aug 03	52	3	0	72		19,978
	Aug 07	31	2	2	39		10,696
	Aug 10	31	1	5	21		11,280
	Aug 13	59	2	3	35		13,305
	Aug 16	23	2	5	11		3,567
	Aug 20	62	3	4	4		6,424
	Aug 23	42	1	0	0		2,739
	Aug 26	21	0	0	0		1,218
Total		117	510	2,965	18,147	0	112,442
1997	Jun 23						
	Jul 31						
	Aug 06	37	17	6	404		8,321
	Aug 12	46	4	4	54		9,679
	Aug 18	60		2	1		4,903
Total		79	21	12	459	0	22,903
1998	Jun 24						
	Jun 29	18	404	973	3,053		
	Jul 3	27	194	1,457	3,941		
	Jul 11	24	49	688	2,889		1
	Jul 22	60	84	267	5,596		683
	Jul 27	47	68	235	1,744		1,586
	Aug 1	44	21	57	708		3,887
	Aug 6	57	6	8	332		9,498
	Aug 11	64	5	12	87		15,231
	Aug 17	70	5	8	23		10,366
	Aug 22	65	4	10	11		5,486
	Aug 29	24	0	0	7		1,087
Total		136	840	3,715	18,391	0	47,825

Figure 1. Map of the study area showing the location of the study area in the state of Georgia. The map shows the location of the study area in the state of Georgia, relative to the major cities of Atlanta, Savannah, and Augusta. The study area is located in the northern part of the state, near the border with North Carolina.



# KUSKOKWIM MANAGEMENT AREA



Figure 1. Kuskokwim Area map showing salmon management districts and escapement monitoring projects.

KUSKOKWIM MANAGEMENT AREA DISTRICT W-1

**KUSKOKWIM RIVER**

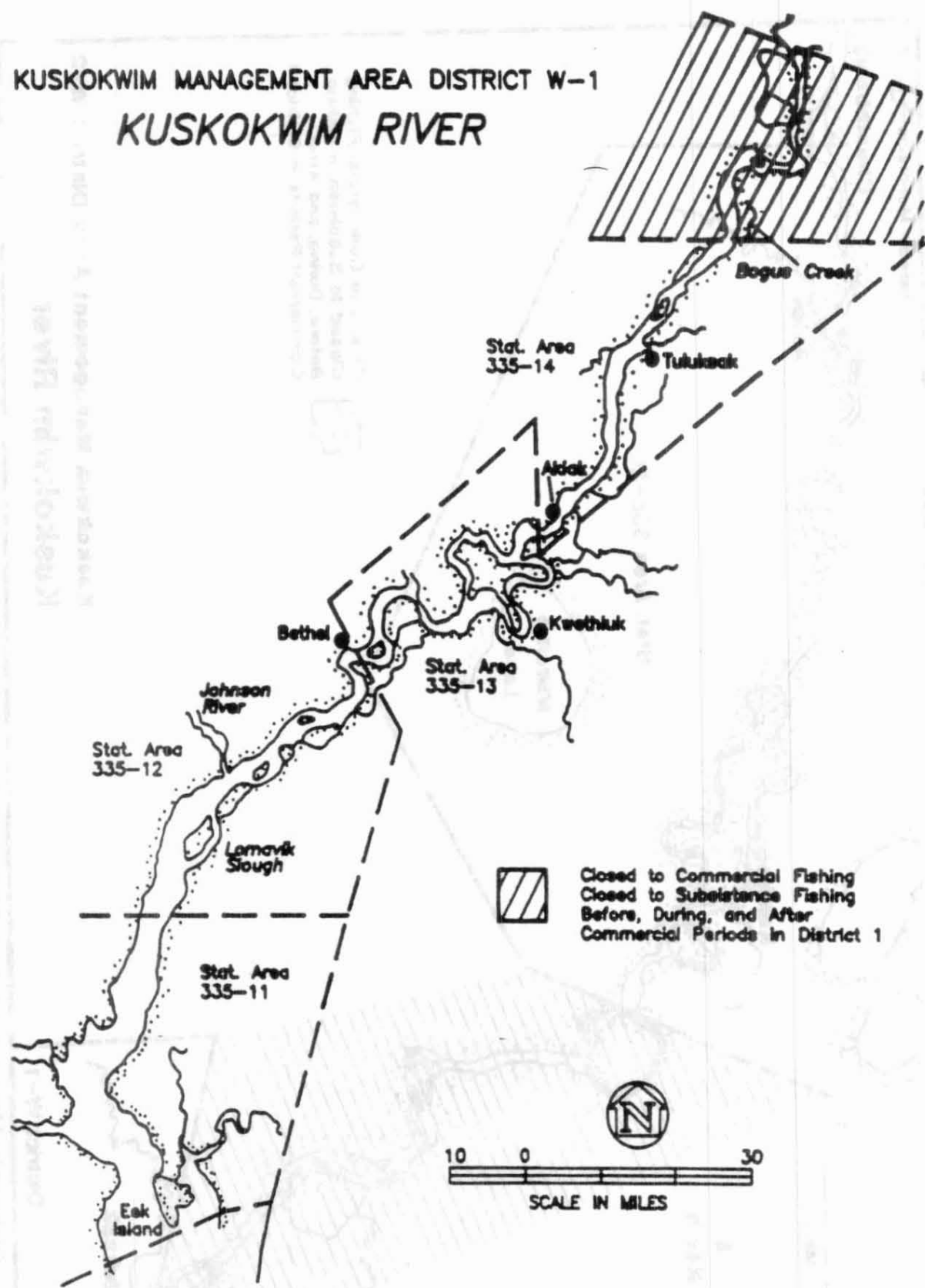
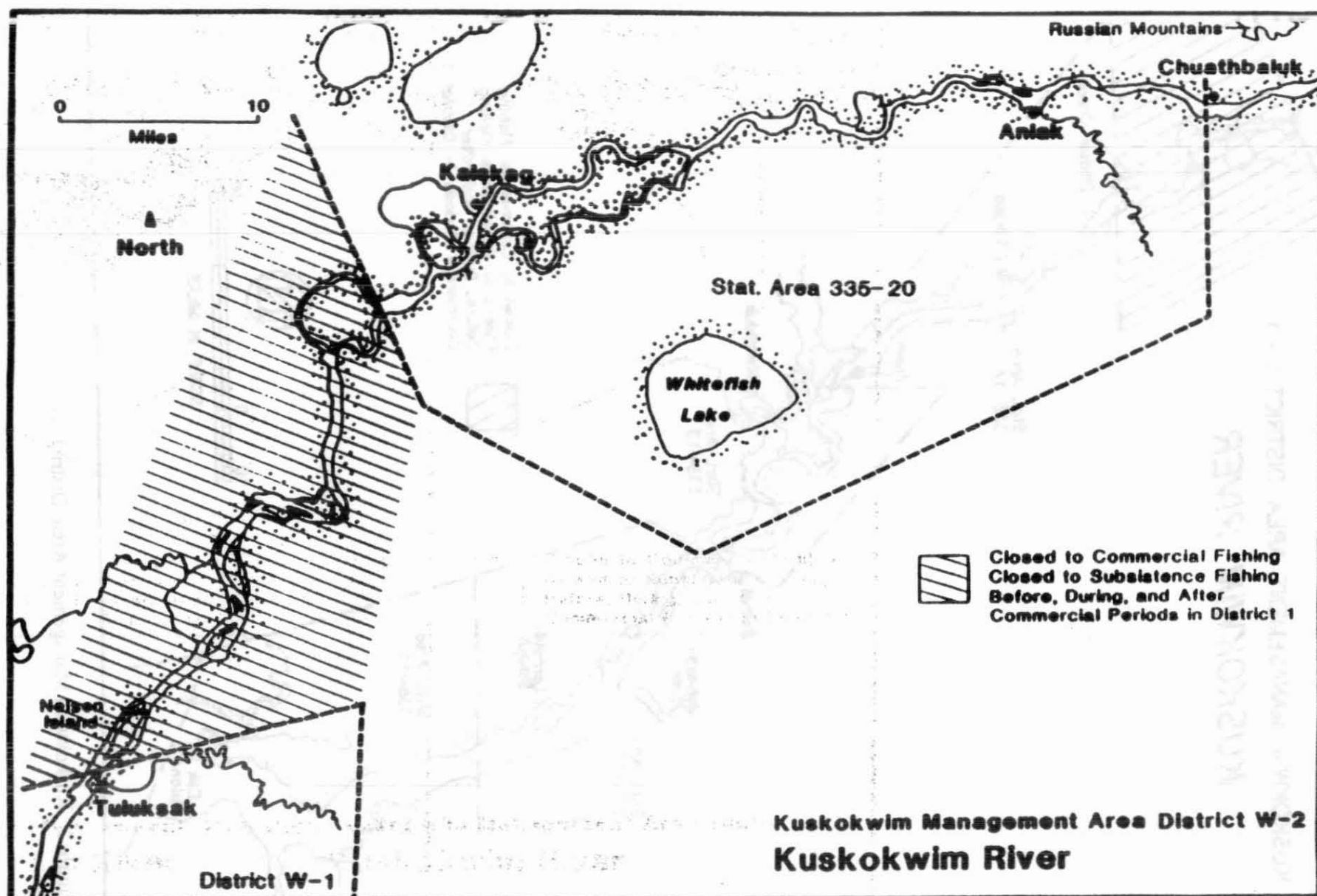
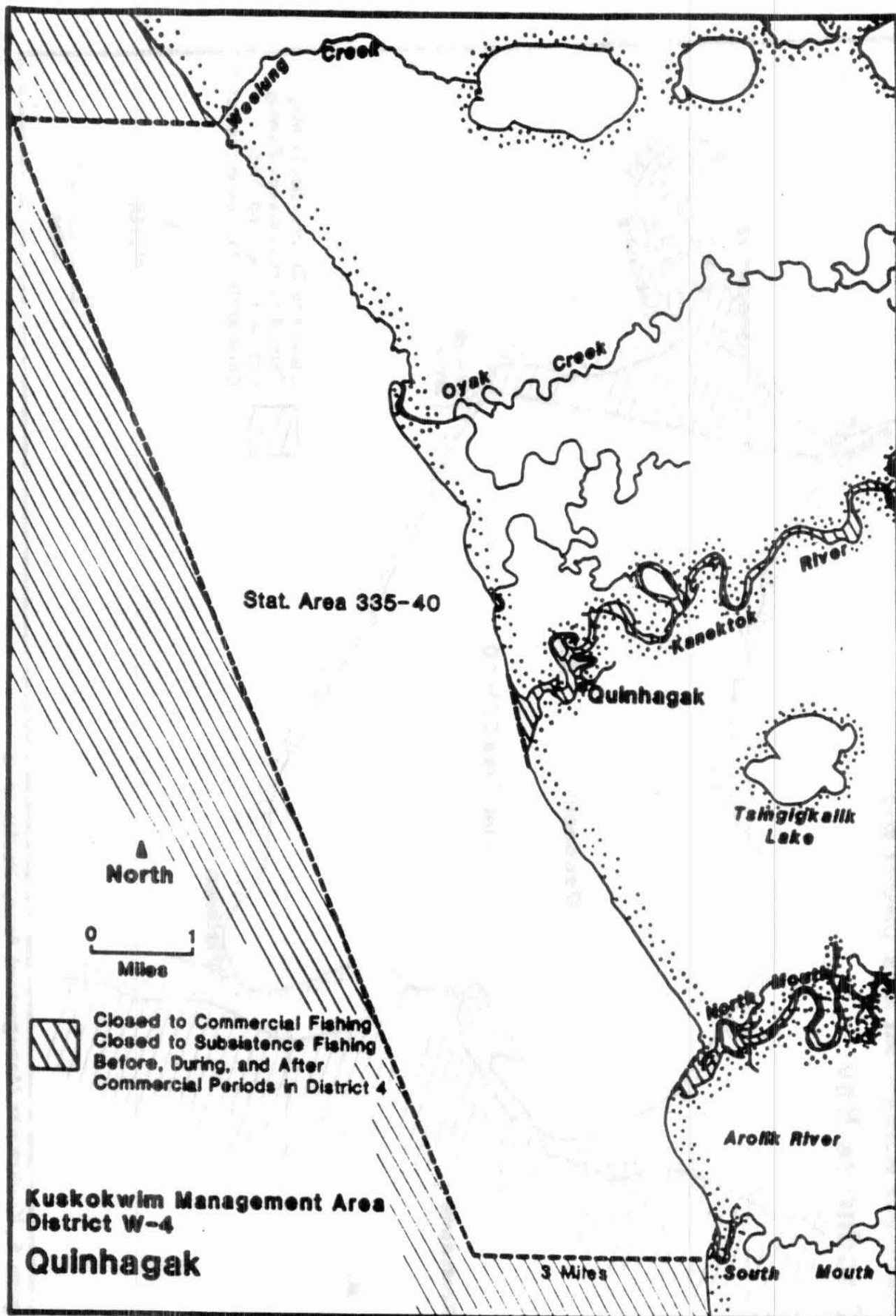


Figure 2. Kuskokwim Management Area, District W-1

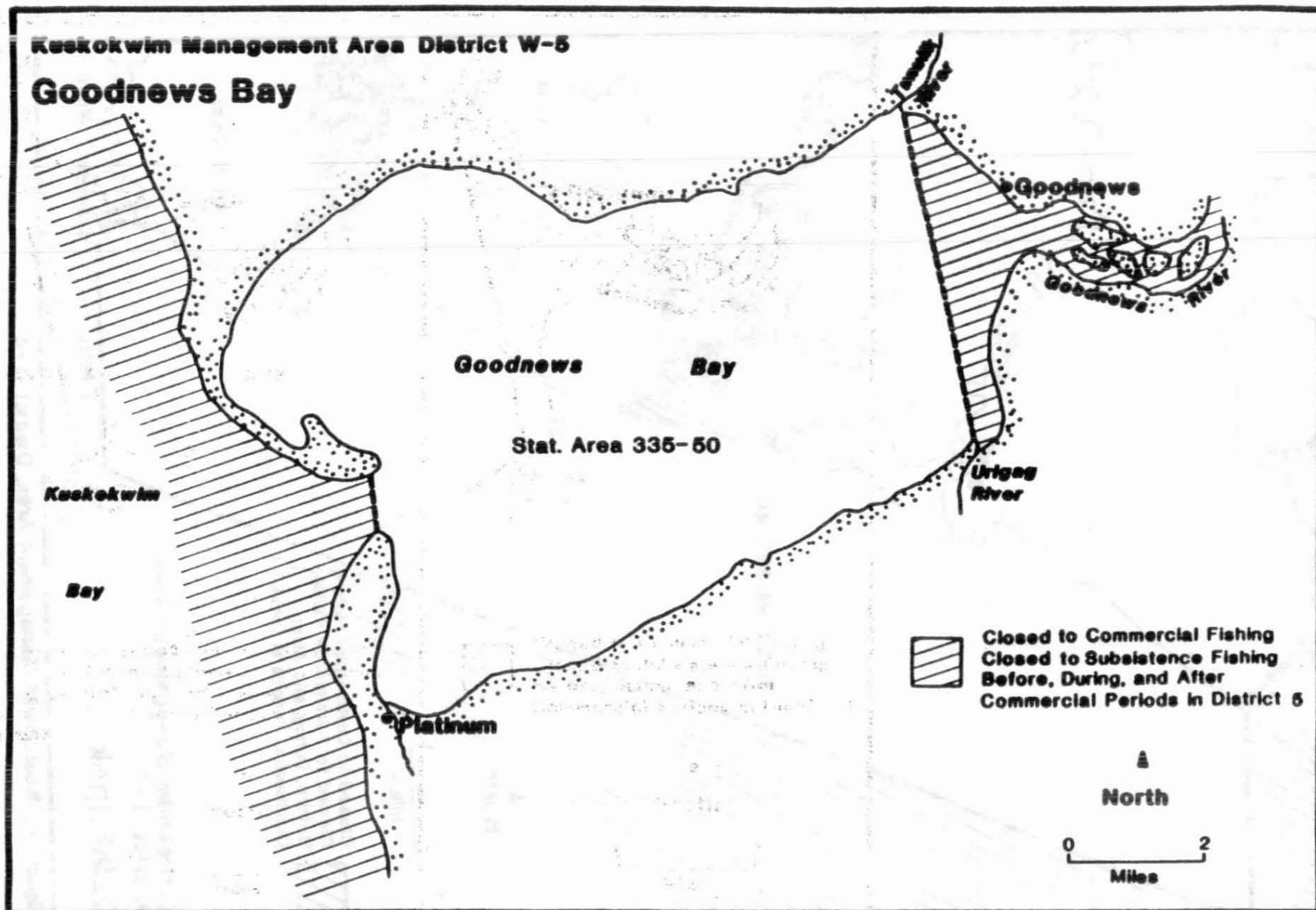


**Figure 3. Kuskokwim Management Area, District W-2**



**Figure 4. Kuskokwim Management Area, District W-4**





**Figure 5. Kuskokwim Management Area, District W-5**

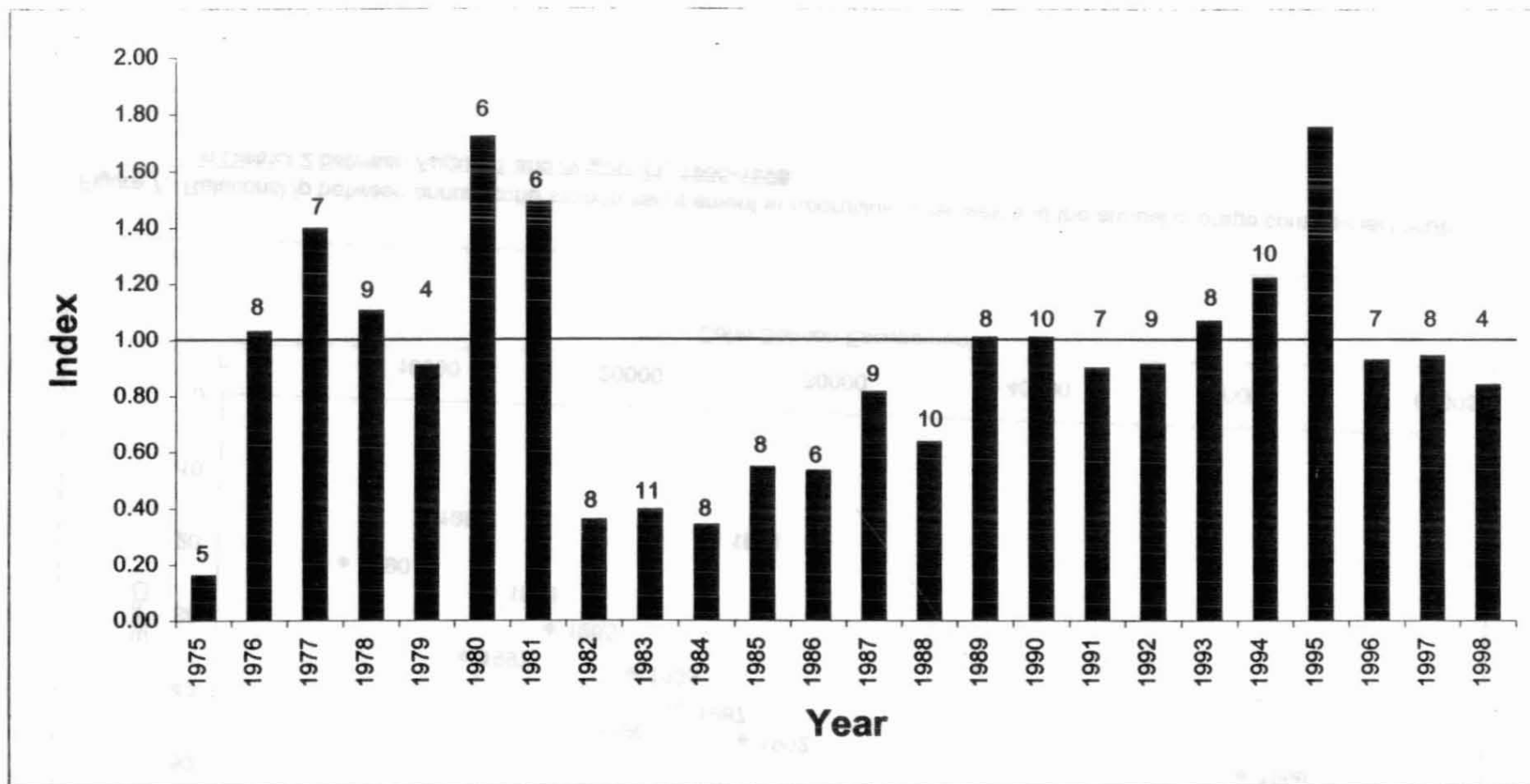


Figure 6. The Kuskokwim River chinook salmon escapement index, 1975-1998.<sup>1</sup>

<sup>1</sup>The index represents relative escapement of 13 possible index streams for which adequate data is available. Numbers on top of bars indicate the number of index streams represented. The index scale represents the relative proportion of the BEG, if a BEG has been established, otherwise it represents the proportion of the median historical escapement. Index values greater than or equal to one mean that the BEG or historical median escapement was achieved in half or more of the streams. Index values of less than one mean that the BEG or historical median escapement was not achieved in over half the streams.

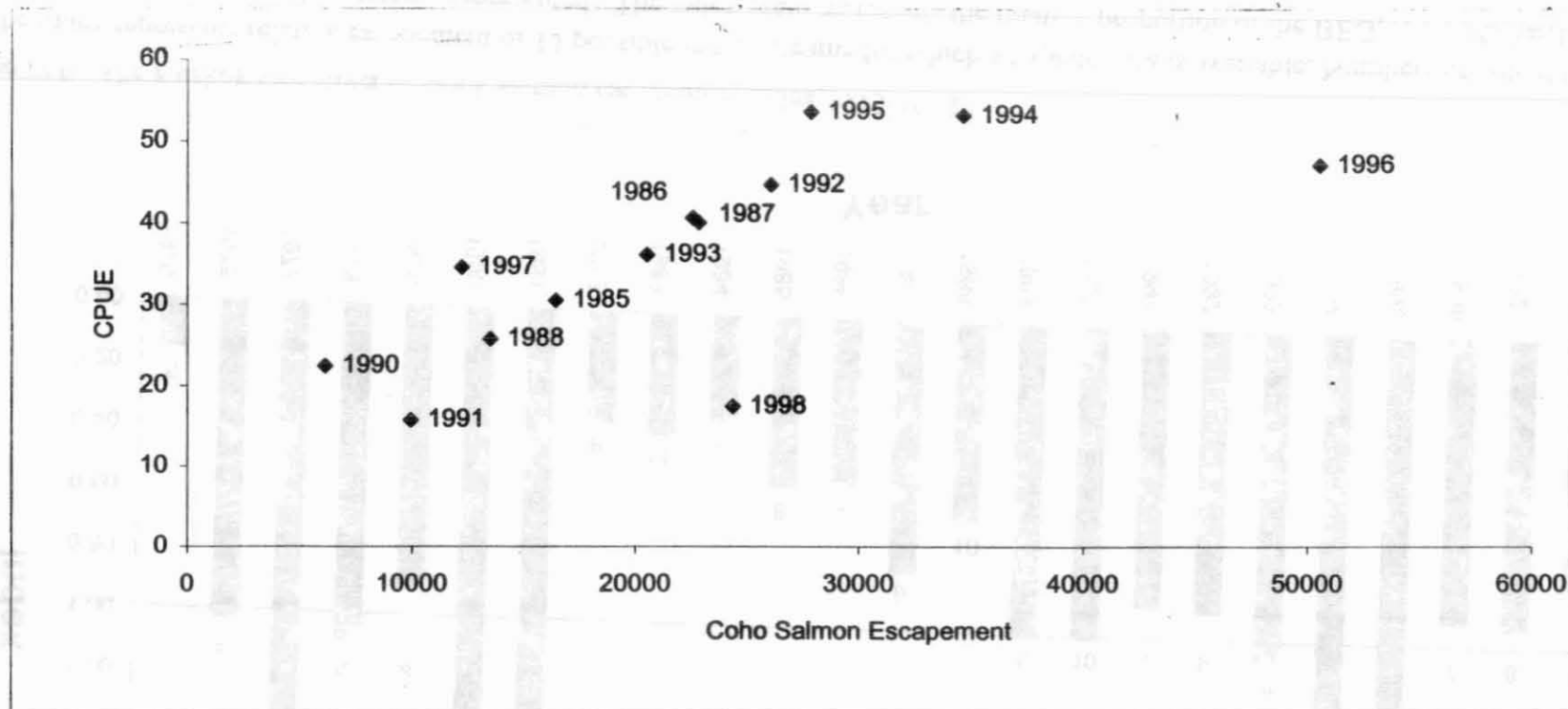


Figure 7. Relationship between annual coho salmon escapement at Kogrukluk River weir and the annual average commercial CPUE in District 2 between August 1 and August 21, 1985-1998.

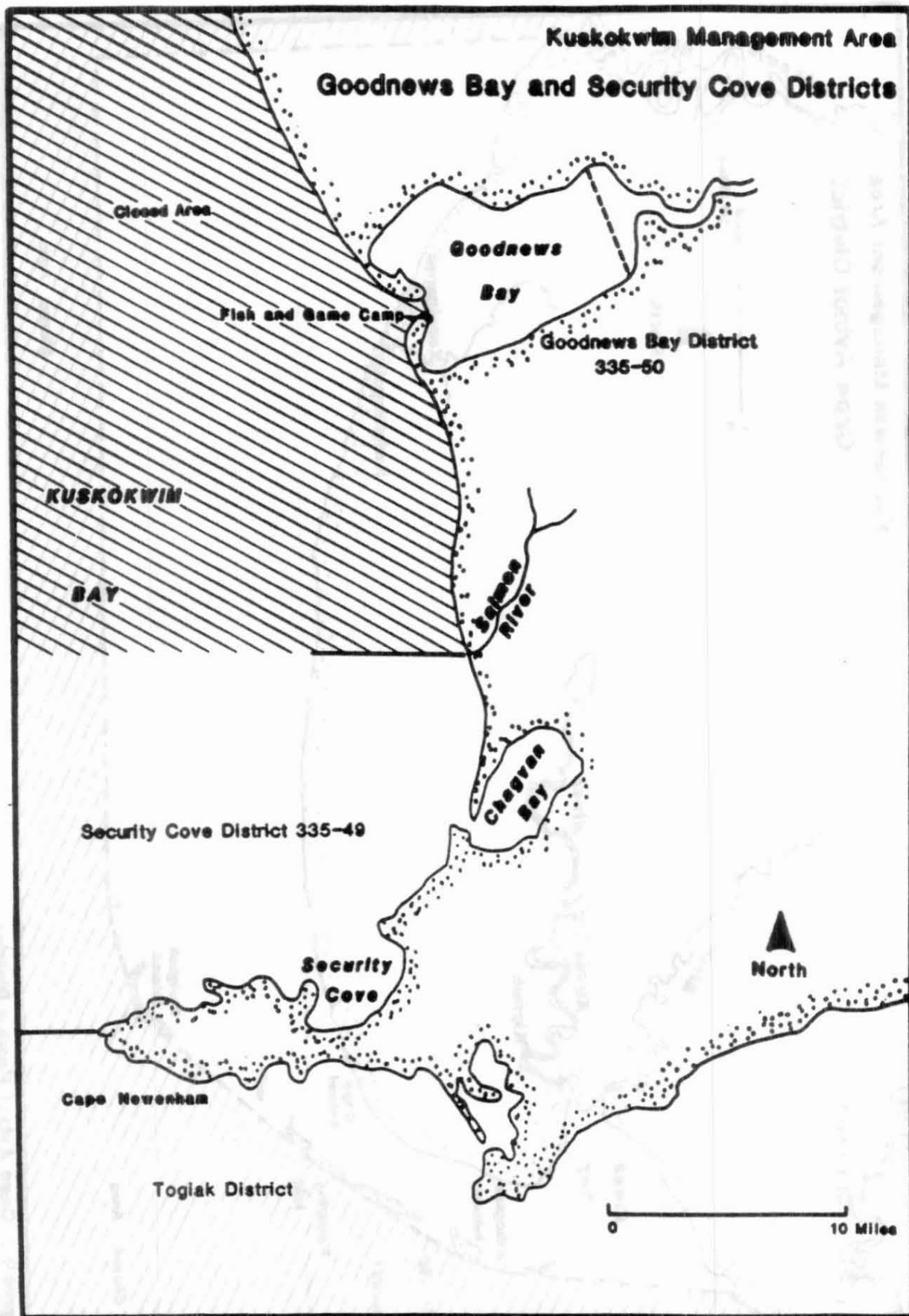
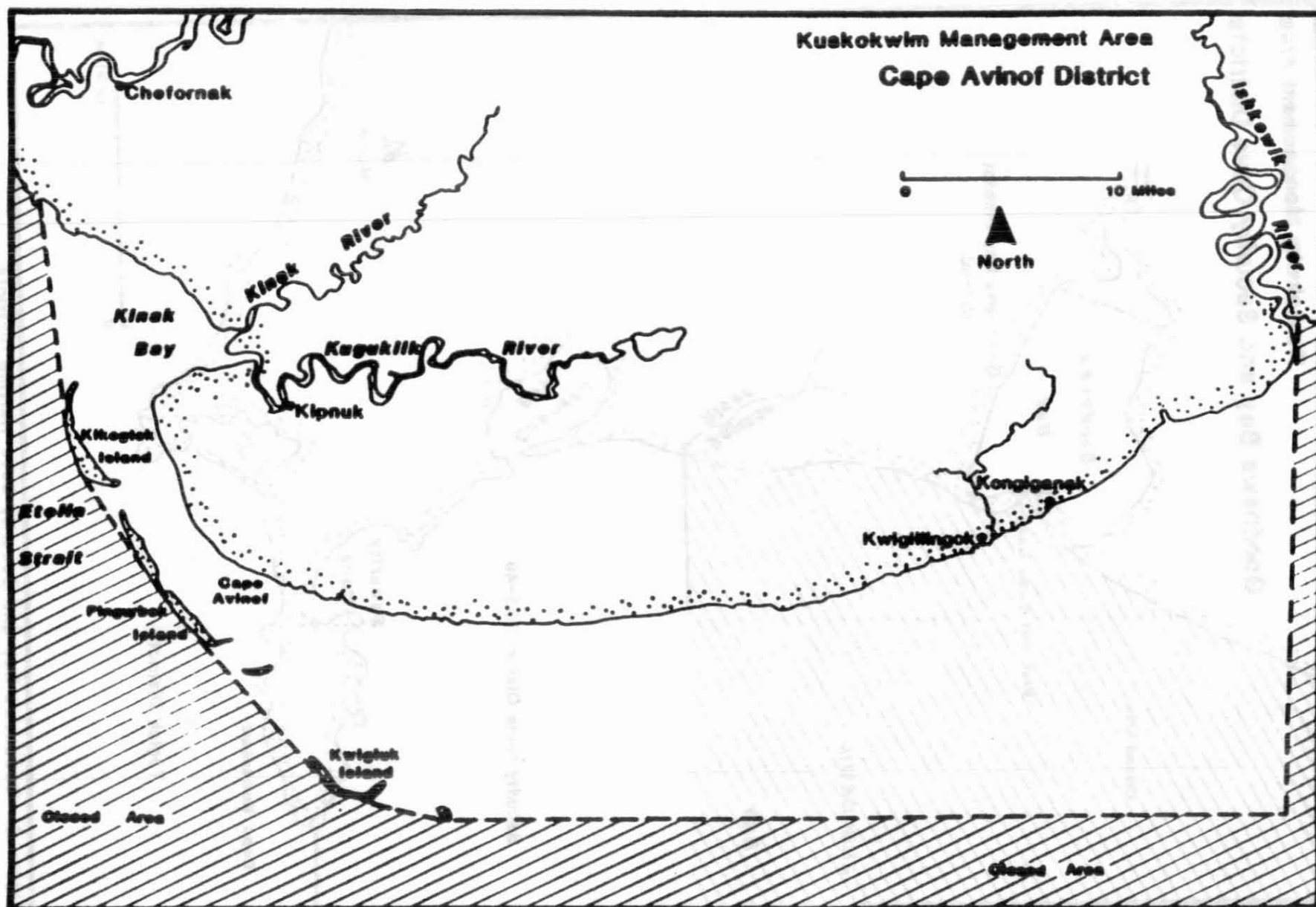
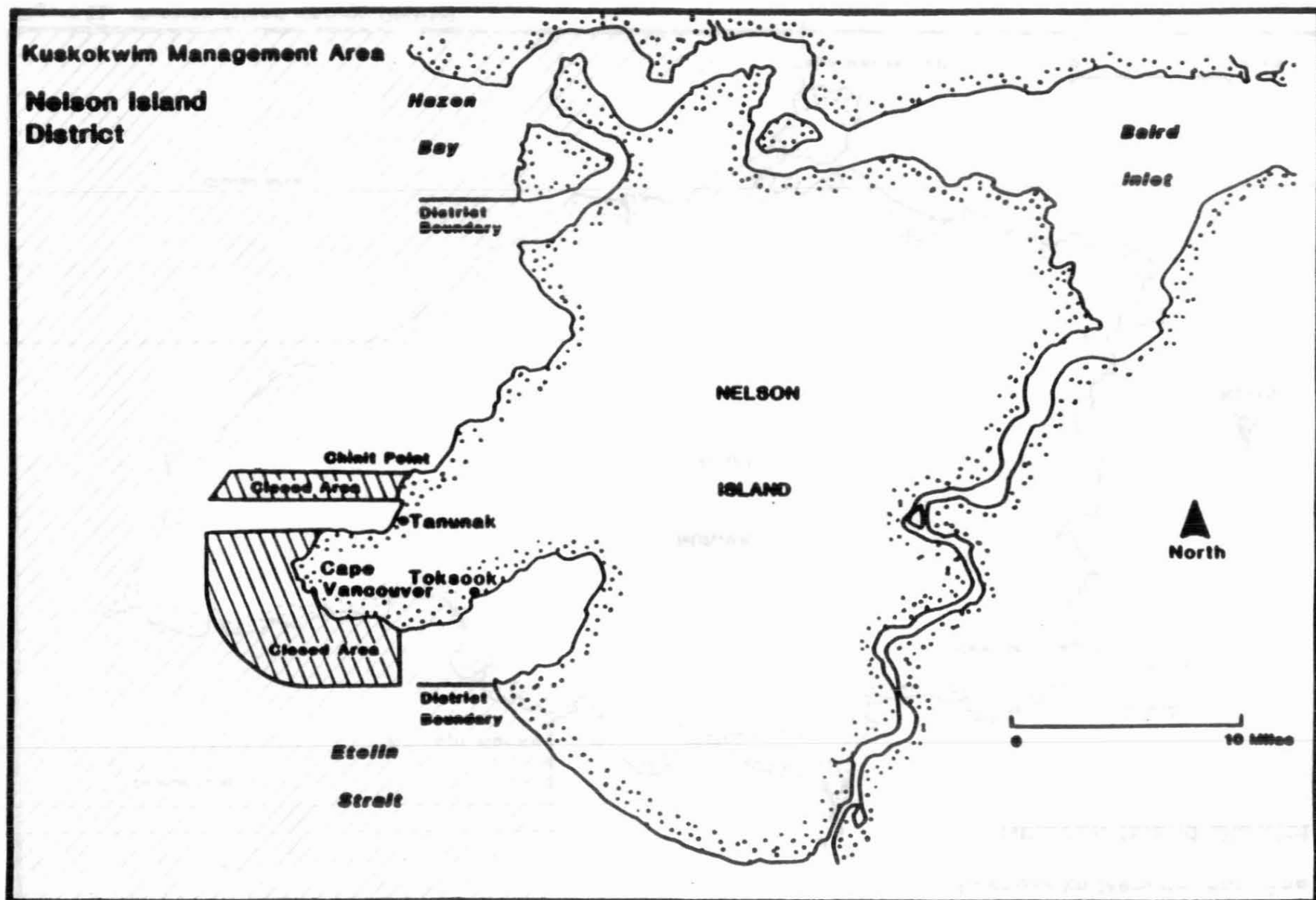


Figure 8. Goodnews Bay and Security Cove Herring Districts



**Figure 9 . Cape Avinof Herring District**



**Figure 10. Nelson Island Herring District**



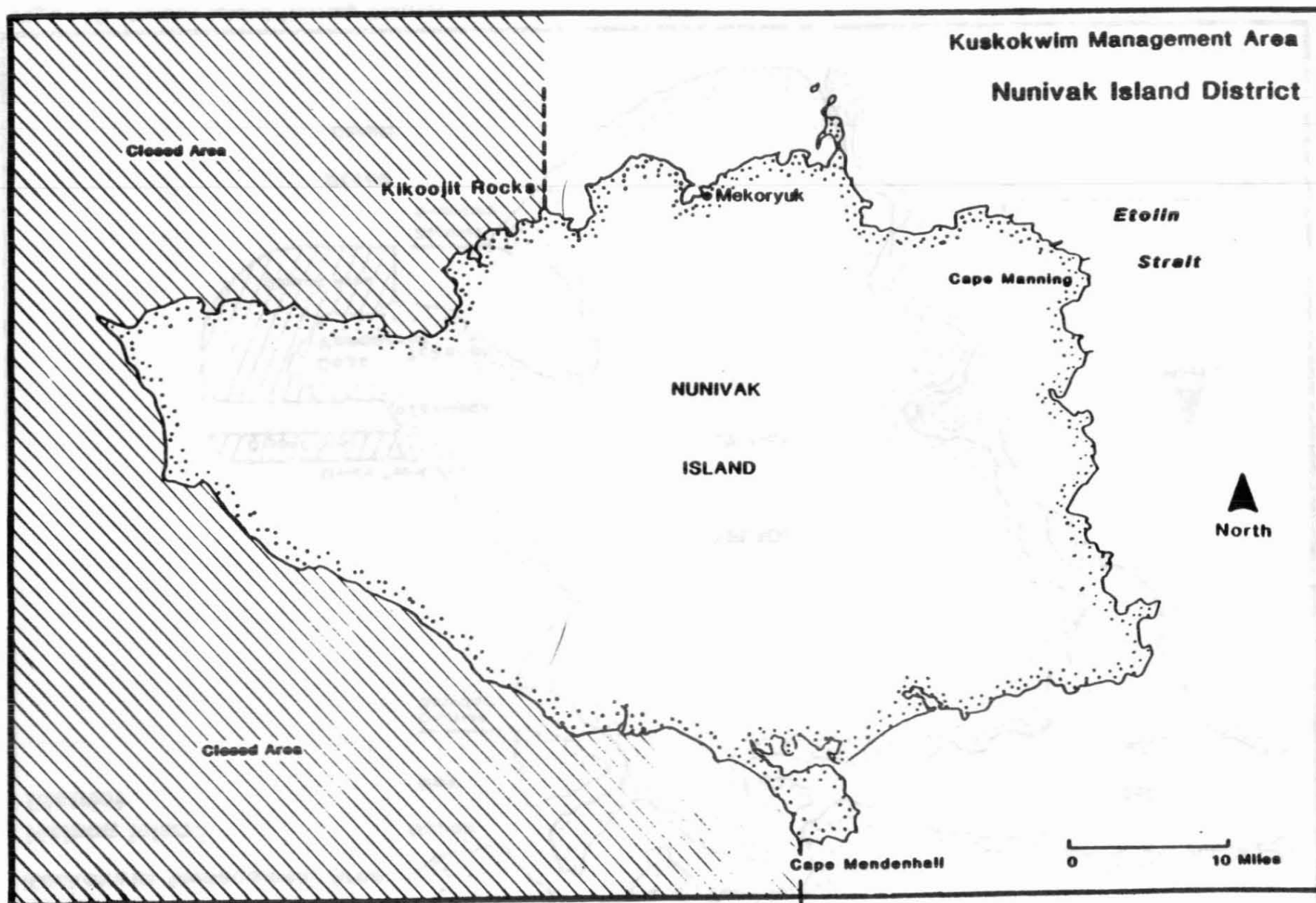


Figure 11. Nunivak Island Herring District

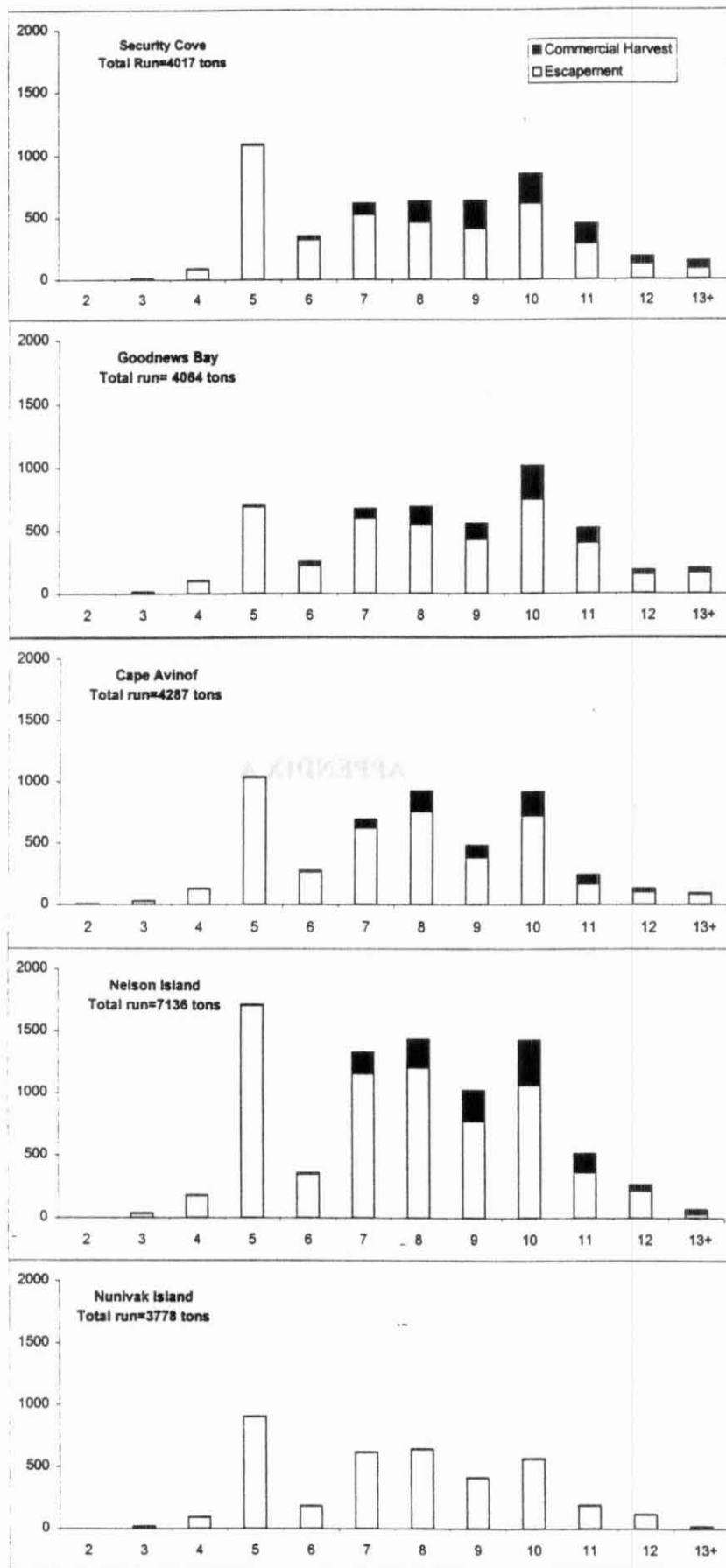


Figure 12. Age composition of Pacific herring for the escapement and harvest in the Kuskokwim Area, Alaska, 1998.

## APPENDIX A

Appendix A.1. Fish species commonly found in the Kuskokwim Area.

Species Code	Genus and Species <sup>a</sup>	Common Name <sup>a</sup>
110	<i>Gadus macrocephalus</i>	Pacific Cod
113	<i>Eleginus gracilis</i>	Saffron Cod
129	<i>Platichthys stellatus</i>	Starry Flounder
122	<i>Pleuronectes glacialis</i>	Arctic Flounder
127	<i>Pleuronectes aspera</i>	Yellowfin Sole
128	<i>Pleuronectes vetulus</i>	English Sole
162	<i>Cottus cognatus</i>	Slimy Sculpin
166	<i>Oligocottus maculosus</i>	Tidepool Sculpin
192	<i>Hexagrammos stelleri</i>	Whitespotted Greenling
200	<i>Hippoglossus stenolepis</i>	Pacific Halibut
230	<i>Clupea pallasii</i>	Pacific Herring
410	<i>Oncorhynchus tshawytscha</i>	Chinook Salmon
420	<i>Oncorhynchus nerka</i>	Sockeye Salmon
430	<i>Oncorhynchus kisutch</i>	Coho Salmon
440	<i>Oncorhynchus gorbusha</i>	Pink Salmon
450	<i>Oncorhynchus keta</i>	Chum Salmon
500	<i>Esox lucius</i>	Northern Pike
513	<i>Osmerus mordax</i>	Rainbow Smelt
514	<i>Hypomesus olidus</i>	Pond Smelt
516	<i>Mallotus villosus</i>	Capelin
520	<i>Salvelinus alpinus</i>	Arctic Char
532	<i>Salvelinus malma</i>	Dolly Varden
541	<i>Oncorhynchus mykiss</i>	Rainbow Trout
550	<i>Salvelinus namaycush</i>	Lake Trout
570	<i>Stenodus leucichthys</i>	Inconnu
588	<i>Coregonus nasus</i>	Broad Whitefish
589	<i>Coregonus pidschian</i>	Humpback Whitefish
583	<i>Coregonus sardinella</i>	Least Cisco
584	<i>Coregonus autumnalis</i>	Arctic Cisco
586	<i>Prosopium cylindraceum</i>	Round Whitefish
590	<i>Lota lota</i>	Burbot
600	<i>Lampetra tridentata</i>	Pacific Lamprey
601	<i>Lampetra japonica</i>	Arctic Lamprey
610	<i>Thymallus arcticus</i>	Arctic Grayling
630	<i>Dallia pectoralis</i>	Alaska Blackfish
640	<i>Catostomus catostomus</i>	Longnose Sucker
660	<i>Gasterosteus aculeatus</i>	Threespine Stickleback
661	<i>Pungitius pungitius</i>	Ninespine Stickleback
670	<i>Percopsis omiscomaycus</i>	Trout Perch
NA	<i>Megalocottus platycephalus</i>	Belligerent Sculpin
NA	<i>Myoxocephalus quadricornis</i>	Fourhorn Sculpin

<sup>a</sup> Based on American Fisheries Society Special Publication No. 20, Common and Scientific Names of Fishes from the United States and Canada (Fifth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1991.

Appendix A.2. Historic events, which have potential or actual, influence on the commercial salmon fisheries of the Kuskokwim Area.

YEAR	EVENT *
1913	• Commercial sale of salmon export first documented in the Kuskokwim Area.
1954	• Commercial chinook salmon quota established.
1959	• First chinook landing since quota established.
1960	• Kanektok Counting Tower (1960-1962) • Quinhagak District (W-4) commercial salmon fishery established. • Kuskokwim Area divided into four subdistricts; Lower Kuskokwim River (Subdistrict 1), Middle Kuskokwim River (Subdistrict 2), Upper Kuskokwim River (Subdistrict 3), Quinhagak (Subdistrict 4). District boundaries are not well recorded; in the Aniak area some commonly used drift sites overlap between District 2 and 3 which confused catch reporting. • Kuskokwim River Drainage Surveys, 1960.
1961	• ADF&G Kuskokwim River tagging study.
1962	• ADF&G Kuskokwim River tagging study. • Boundary between Subdistricts 2 and 3 changed; the new location was not recorded but the most likely location was Kolmakof River. The reason for the change was to move the boundary to a point which was between commonly used gillnet locations and thereby avoid confusion in catch reporting. As a result, there were no landings in Subdistrict 3.
1963	• ADF&G Kuskokwim River tagging study. • Boundaries of subdistrict documented; Subdistrict 1 extended from Kuskokuak to Mishevik Slough, Subdistrict 2 was from Mishevik Slough to Kolmakof River, Subdistrict 3 was upstream of Kolmakof River.
1965	• Kwegoooyuk test fishery (1965-1984; no records available for 1965).
1966	• ADF&G Kuskokwim River tagging study. • Subdistrict 3 was deleted from the regulations due to a lack of landings.
1968	• Goodnews Bay District (W-5) commercial salmon fishery established.
1969	• District 4 tagging study (1969-1970) on chinook and chum salmon. • Kogruklu River (aka. Holitna River, Ignatti) tower/weir (1969-present).
1970	• Effect of explosive detonation in ice on northern pike.
1971	• Commercial fishing time in the Kuskokwim River reduced from two 24 hour periods per week to two 12 hour periods per week. • Chum fishery begins in the Kuskokwim River; season was from 25 June to 31 July, location limited to waters downstream of Napakiak, mesh size restricted to 6 in. or smaller. • Fishing periods established by Emergency Order in August. • Gillnet mesh size in Districts 4 and 5 restricted to 6 inch or smaller.
1974	• Commercial sale of salmon roe from subsistence caught fish (1974-1977)

-continued-

YEAR	EVENT*
1976	<ul style="list-style-type: none"> <li>Commercial fishing time in the Kuskokwim River was reduced from two 12 hour periods per week to two 6 hour periods per week.</li> <li>Eek River reconnaissance survey.</li> <li>Study on genetic variants in chum and chinook salmon.</li> </ul>
1977	<ul style="list-style-type: none"> <li>Fishing periods to be established by Emergency Order before 26 June and after 31 July.</li> <li>Limited entry permits issued.</li> <li>Subsistence fishing closed 24 hours before during and 6 hours after each commercial fishing period.</li> <li>Hoholitna River reconnaissance survey</li> </ul>
1978	<ul style="list-style-type: none"> <li>Kasigluk River reconnaissance survey.</li> <li>Kwethluk River sonar project.</li> </ul>
1979	<ul style="list-style-type: none"> <li>The portion of District 1 used during the chum salmon season was extended from Napakiak upstream to Bethel.</li> <li>Kasigluk River sonar project.</li> <li>High seas salmon fleet moved to 20° west.</li> </ul>
1980	<ul style="list-style-type: none"> <li>Subsistence fishing closed 24 hours before, during and 6 hours after each commercial fishing period.</li> <li>Aniak River sonar project.</li> </ul>
1981	<ul style="list-style-type: none"> <li>Pilot test fish and FanScan projects at Bethel.</li> <li>Inventory of Kisaralik River and Lake.</li> <li>Goodnews River counting tower (1981-1990).</li> <li>Salmon River (Pitka Fork drainage) weir project (1981-1984).</li> <li>Species identification program results in better differentiation of sockeye and chum salmon.</li> </ul>
1982	<ul style="list-style-type: none"> <li>Kanektok River sonar project (1982-1986).</li> </ul>
1983	<ul style="list-style-type: none"> <li>Pilot test fish project at Bethel using drift gillnets.</li> <li>Provisional escapement goals established for many of the major spawning tributaries in the area.</li> <li>Management strategy shifts from guideline harvest based to obtaining escapement objective.</li> </ul>
1984	<ul style="list-style-type: none"> <li>Kwegooyuk test fishery replaced by the Bethel drift test fishery.</li> </ul>
1985	<ul style="list-style-type: none"> <li>Commercial fishing restricted to mesh sizes less than or equal to 6 inches.</li> <li>Chum season utilizes entire length of District 1.</li> </ul>
1986	<ul style="list-style-type: none"> <li><i>Migratory timing of coho salmon in the Kuskokwim Area, 1979-1984.</i></li> <li>Kuskokwim River salmon abundance estimate based on calibrated test fish CPUE.</li> <li>Downstream boundary of District 1 extended to a line from Apokak Slough to Popokamiut.</li> </ul>
1987	<ul style="list-style-type: none"> <li>Discontinued the directed chinook salmon fishery in the Kuskokwim River.</li> <li>First fishing period restricted to that portion of District 1 which is downstream of Bethel due to chinook conservation concerns.</li> <li>Subsistence fishing in all of District 2 and its tributary streams is closed before, during and after commercial periods.</li> <li>South peninsula sockeye and chum salmon tagging study.</li> </ul>

-continued-



YEAR	EVENT <sup>a</sup>
1988	<ul style="list-style-type: none"> <li>• Review of the estimation of Kuskokwim River annual salmon passage through expansion of the Bethel test fish CPUE.</li> <li>• Kuskokwim River sonar project (1988-1995).</li> <li>• Kuskokwim River subsistence test fisheries (1988-1990).</li> <li>• District 1 upstream boundary extended to Bogus Creek.</li> <li>• District 2 reduced in size; downstream boundary moved upstream to High Bluffs, the upstream boundary moved downstream to Chuathbaluk.</li> <li>• Portion of Kuskokwim River between Districts 1 and 2 closed to subsistence fishing when District 1 subsistence fishing is closed.</li> <li>• Reorganization of District 1 Statistical Areas.</li> <li>• District 4 Salmon Management Plan adopted.</li> <li>• Establishment of the Kuskokwim River Salmon Management Working Group (1988-present).</li> <li>• Eek Test Fishery (1988-1990, 1992-1995).</li> </ul>
1989	<ul style="list-style-type: none"> <li>• USFWS conducted genetic sampling throughout the Kuskokwim Area.</li> <li>• USFWS conducted chinook tagging study in the lower Kuskokwim River.</li> <li>• Record low temperatures recorded in interior Alaska coupled with shallow snow pack threaten survival of salmon eggs/fry from 1988 spawning.</li> </ul>
1990	<ul style="list-style-type: none"> <li>• ADF&amp;G genetic sampling (1990 - 1996).</li> <li>• Reorganization of District 1 statistical areas.</li> <li>• Upstream boundary of District 1 moved downstream from Bogus Creek to Big (Nelson) Island.</li> <li>• Downstream boundary of District 2 moved upstream to second slough below Kalskag.</li> <li>• District 4 northern boundary is extended north to Weelung Creek.</li> </ul>
1991	<ul style="list-style-type: none"> <li>• USFWS begins operation of weir on Tuluksak River (1991-1994).</li> <li>• Weir replaces counting tower on Goodnews River (1991-present).</li> </ul>
1992	<ul style="list-style-type: none"> <li>• Aniak and Chuathbaluk test fisheries (1992-1995).</li> <li>• Eek test fishery is re-established for the coho season.</li> <li>• USFWS operates Kwethluk River weir (1992)</li> <li>• Ban on high-seas drift gillnet fishing imposed.</li> <li>• Unusual proportion of returning 5 year old chum salmon had a compressed annulus between the second the third winter checks.</li> <li>• Failure of age 4 chum salmon in the Kuskokwim River; Aniak drainage especially hard hit; attributed to cold winter of 1988-89.</li> </ul>
1993	<ul style="list-style-type: none"> <li>• Failure of age 4 and 5 chum salmon in the Kuskokwim River, Yukon River, and the Norton Sound/Kotzebue Area; cause unknown; especially hard hit were the Aniak drainage and the Yukon fall chum; commercial fishing severely restricted, chum sport fishery was closed, and the subsistence salmon fishery was restricted and closed for a period of time (first time ever).</li> </ul>
1994	<ul style="list-style-type: none"> <li>• Working Group commissioned and Dr. Mundy started "Recommendations for Strengthening the Cooperative Management Process of the Kuskokwim River Salmon Management Working Group".</li> <li>• Upstream boundary of District 1 moved upstream to Bogus Creek.</li> </ul>

-continued-

YEAR	EVENT*
1995	<ul style="list-style-type: none"> <li>• BSFA operates a chum salmon radio telemetry project on the Kuskokwim River.</li> <li>• Takotna Community School operates a salmon counting tower on the Takotna River (1995-present).</li> <li>• AVCP and BSFA operate the Lower Kuskokwim test fishery in cooperation with the department; the project is a modification of the Eek test fishery.</li> </ul>
1996	<ul style="list-style-type: none"> <li>• ADF&amp;G genetic sampling for late spawning chum salmon and one mixed stock sample from District 1.</li> <li>• Near record low water levels on the Kuskokwim River during June and early August coupled with record high water temperatures.</li> <li>• Irregular fishing schedule in District 1 during June and July due to limited market interest for chum salmon.</li> <li>• Record early coho run coupled with record high harvest and escapement at Kogruklu River.</li> <li>• AVCP operates a salmon counting tower on the Kwethluk River (1996-present).</li> <li>• KNA operates a salmon weir on the George River (1996-present).</li> <li>• Aniak River sonar is relocated to allow for full channel ensonification and configurable sonar technology is employed (1996-present).</li> <li>• Quinhagak IRA begins development of a salmon counting tower on the Kanektok River.</li> </ul>
1997	<ul style="list-style-type: none"> <li>• Kuskokwim River declared an economic disaster area due to very low chum and coho salmon returns, harvests and exvessel prices. Northern boundary of District 4 moved 3 miles south from July 14 to July 28. Record low chum salmon escapement at Kogruklu River weir.</li> <li>• Aniak chum salmon return vastly exceeded expectations based on 1992-1993 spawning abundance estimates.</li> <li>• Due to an extremely low return of chum salmon, ADF&amp;G, AVCP, KNA, KRSMWG, ONC, TCC and McGrath Native Council issue a joint appeal for subsistence users to conserve chum salmon. Record low subsistence harvest of chum salmon in the Kuskokwim Area.</li> <li>• Aniak processor does not operate due to depressed salmon market (1997-present)</li> <li>• Sale of salmon roe is prohibited in Districts 1 and 2 (effective beginning December 1997).</li> <li>• Middle Fork Goodnews River weir converted from fixed-panel to a resistance board "floating weir" and operated through majority of coho run for first time (1997-present).</li> <li>• Quinhagak IRA operates a salmon counting tower on the Kanektok River (1997-present).</li> </ul>
1998	<ul style="list-style-type: none"> <li>• Kuskokwim River declared an economic disaster area for second straight year due to low chum and coho salmon returns, harvests and exvessel prices.</li> <li>• KNA operates a salmon weir on the Tatlawiksuk River.</li> <li>• High water levels severely restrict operational period of many Kuskokwim Area escapement projects</li> </ul>

\* For additional information on specific topics refer to the Region III Report Catalog or historical Area Management Reports for the Kuskokwim Area.

Appendix A.3 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.

		Escapement Objectives <sup>a</sup>			
		Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>					
1.	Kwethluk River				
a.	3-step Mt. to Canyon Cr.	1.0	-	-	7.0
b.	Canyon Creek	0.2	-	-	-
2.	Kisaralik River				
a.	Airstrip to Kisaralik L.	1.0	-	-	8.0
b.	Kasigluk R. (upper to lower)	0.1	-	-	4.0
3.	Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4.	Aniak River				
a.	Buckstock R. to Aniak L.	1.5	-	-	10.0
b.	Salmon River	0.6	-	-	3.0
c.	Aniak Sonar Project <sup>b</sup>	-	-	-	250.0
5.	Holitna River				
a.	Nogamut to Kashegelok	2.0	-	-	12.0
b.	Kogrukluk Weir <sup>c</sup>	10.0	-	25.0	30.0
6.	Salmon River (Pitka Fork)	1.3	-	-	-
<u>KUSKOKWIM BAY:</u>					
1.	Kanektok River to Kagati Lake	5.8	15.0	25.0	30.5
2.	Goodnews River System				
a.	Main Fork and lakes	1.6	15.0	15.0	17.0
b.	Middle Fork and lakes	0.8	5.0	2.0	4.0
c.	Middle Fork Weir <sup>c</sup>	3.5	25.0	-	15.0

a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

b Sonar total escapement estimates.

c Weir total escapement estimates.

Appendix A.4. Kuskokwim Area commercial, subsistence and personal use salmon catches, 1913-1998.

Year	Commercial Harvest						Subsistence Harvest				Total Harvest
	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	
1913	7,800					7,800					7,800
1914		2,667				2,667					2,667
1915											0
1916	949					949					949
1917	7,878					7,878					7,878
1918	3,055					3,055					3,055
1919	4,836					4,836					4,836
1920	34,853					34,853					34,853
1921	9,854					9,854					9,854
1922	8,944	6,120				15,064				180,000	195,064
1923	7,254					7,254					7,254
1924	19,253	900		7,167	7,167	34,487	17,700	203,148		220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850		241,650	249,094
1926										738,576	738,576
1927										286,254	286,254
1928										481,090	481,090
1929										560,196	560,196
1930	7,626	2,448				10,074				538,650	548,724
1931	8,541					8,541				389,367	397,908
1932	9,339					9,339				746,415	755,754
1933							6,290	443,998		450,288	450,288
1934							20,800	597,132		617,932	617,932
1935	6,448				8,296	14,744	22,930	554,040		576,970	591,714
1936	624					624	33,500	549,423		582,923	583,547
1937	480					480		537,111		537,111	537,591
1938	624				828	1,452	10,153	400,242		410,395	411,847
1939	134					134	14,000	125,425		139,425	139,559
1940	247				500	747	8,000	415,523		423,523	424,270
1941	187				674	861	8,000	415,523		423,523	424,384
1942							6,400	325,339		331,739	331,739

- continued -

Year	Commercial Harvest						Subsistence Harvest				Total
	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	Harvest
1943							6,400	325,339		331,739	331,739
1944											
1945											0
1946	2,288				674	2,962					2,962
1947	5,356					5,356					5,356
1948											0
1949											0
1950											0
1951	4,210					4,210					4,210
1952											0
1953											0
1954	57					57					57
1955											0
1956											0
1957											0
1958											0
1959	3,760					3,760					3,760
1960	5,969	5,649	0	0	5,498	17,116	18,887	301,753		320,640	337,756
1961	23,246	2,308	18,864	90	5,090	49,598	28,934	179,529		208,463	258,061
1962	20,867	10,313	45,707	4,340	12,432	93,659	13,582	175,304	161,849	350,735	444,394
1963	18,571	0	0	0	15,660	34,231	34,482	170,829	137,649	342,960	377,191
1964	21,230	13,422	707	939	28,992	65,290	29,017	219,208	190,191	438,416	503,706
1965	24,965	1,886	4,242	0	12,191	43,284	24,697	250,878		275,575	318,859
1966	25,823	1,030	2,610	268	22,985	52,716	49,325	175,735		225,060	277,776
1967	29,986	652	8,235	0	58,239	97,112	61,262	214,468		275,730	372,842
1968	43,157	5,884	19,684	75,818	154,275	298,818	35,698	278,008		313,706	612,524
1969	64,777	10,362	50,377	1,251	110,473	237,240	40,617	204,105		244,722	481,962
1970	64,722	12,654	60,566	27,422	62,245	227,609	69,612	246,810	11,868	328,290	555,899
1971	44,936	6,054	99,423	13	10,006	160,432	43,013	116,391	6,899	166,303	326,735
1972	55,598	4,312	97,197	1,952	23,880	182,939	38,176	120,316	1,325	159,817	342,756
1973	51,374	5,224	184,207	634	152,408	393,847	38,451	179,259	23,746	241,456	635,303
1974	30,670	29,003	196,127	60,099	179,579	495,478	26,665	277,170	32,780	336,615	832,093

- continued -

Year	Commercial Harvest						Subsistence Harvest					Total	
	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	Harvest		
1975	28,219	17,686	225,308	910	112,751	384,874	47,569	176,389		223,958	608,832		
1976	49,262	14,636	231,877	39,998	112,130	447,903	58,055	223,792	4,312	286,159	734,062		
1977	58,256	18,621	298,959	434	263,727	639,997	58,158	203,397	12,193	273,748	913,745		
1978	63,194	13,734	282,044	61,968	247,271	668,211	38,145	125,052	12,437	175,634	843,845		
1979	53,314	39,463	297,167	574	308,683	699,201	57,053	163,451		220,504	919,705		
1980	48,599	42,213	561,483	30,306	327,908	1,010,509	62,047	168,987	47,335	278,369	1,288,878		
1981	79,377	105,940	485,653	463	278,541	949,974	64,274	163,554	28,301	256,129	1,206,103		
1982	79,816	97,716	326,481	18,259	567,452	1,089,724	61,141	195,691	45,181	302,013	1,391,737		
1983	93,676	90,834	306,554	379	248,389	739,832	51,020	149,172	2,834	203,026	942,858		
1984	74,016	81,304	488,480	23,902	826,774	1,494,476	60,668	144,651	15,016	220,335	1,714,811		
							Chinook	Sockeye	Chum	Pink	Coho		
1985	74,083	121,221	224,680	111	382,096	802,191	45,720	33,632	95,999	1,062	24,524	1,003,128	
1986	44,972	142,029	349,268	16,569	736,910	1,289,748	54,256	20,239	142,930 <sup>c</sup>		29,742	1,536,915	
1987	65,558	170,849	603,274	163	478,594	1,318,438	71,804	25,180	70,709	291	18,085	1,504,507	
1988 <sup>de</sup>	74,563	149,949	1,443,953	37,592	623,733	2,329,790	75,107	33,102	153,980		43,866	2,635,845	
1989 <sup>d</sup>	66,914	82,365	801,355	819	554,411	1,505,864	85,322	37,088	145,106		57,847	1,831,227	
1990	84,451	203,919	521,023	16,050	443,783	1,269,226	92,678	39,662	131,469		50,713	1,583,748	
1991	48,170	202,441	502,187	522	556,818	1,310,138	90,224	56,404	96,308		55,581	1,608,655	
1992	67,597	192,341	436,506	85,978	772,449	1,554,871	68,665	34,159	99,576		44,496	1,801,767	
1993	26,636	167,235	94,937	71	686,570	975,449	91,721	51,363	61,726		35,295	1,215,554	
1994	27,345	191,169	360,893	84,870	856,100	1,520,377	98,378	39,279	76,951		36,504	1,771,489	
1995	72,352	198,045	707,212	318	555,539	1,533,466	100,159	28,622	68,942		39,165	1,770,354	
1996	22,959	122,260	301,975	1,663	1,099,865	1,548,722	81,598	35,036	90,238		34,698	1,790,292	
1997	47,990	123,002	67,200	7	166,648	404,847	85,506	41,270	40,976		30,714	603,313	
1998	44,402	130,074	268,199	2,720	312,517	757,912	86,115	37,578	67,665		27,240	976,510	
10-Year Average							10-Year Average						
1988-97	53,898	163,273	523,724	45,231 <sup>f</sup>	631,592	1,417,717	1988-97	86,936	39,599	96,527	42,888	265,949	1,661,224

<sup>a</sup> Primarily chum and coho salmon.<sup>b</sup> Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimates attempted prior to 1988.<sup>c</sup> Includes sockeye, pink and chum salmon.<sup>d</sup> The personal use catch is included with the subsistence catch.<sup>e</sup> Beginning in 1988, estimates are based on a new formula therefore data since 1988 is not comparable with previous years.<sup>f</sup> Even years only.



Appendix A.5. Commercial Fishing Effort in Permit-Hour<sup>a</sup> for the Kuskokwim Area, 1960-1998.

Year	District W-1	District W-2	District W-3	District W-4	District W-5	Total
1960	5,136	960	648	4,368	Closed	11,112
1961	16,200	1,512	1,512	4,992	Closed	24,216
1962	14,274		0	8,434	Closed	22,708
1963	5,712	1,722	0	5,520	Closed	12,954
1964	6,468	1,140	0		Closed	7,608
1965	13,500	546	0	3,696	Closed	17,742
1966	18,270		Closed		Closed	18,270
1967	88,248	1,932		3,954	Closed	94,134
1968	77,466	720		7,986	4,704	90,876
1969	67,140	1,488		29,952	14,055	112,635
1970	56,646	3,414		22,080	9,756	91,896
1971	18,060	1,842				19,902
1972	47,802					47,802
1973	77,478	3,072		18,372	2,928	101,850
1974	124,569	4,950		18,984	8,148	156,651
1975	181,786	3,648		12,312	5,400	203,146
1976	82,788	3,894		14,784	4,848	106,314
1977	73,944	3,426		17,592	3,780	98,742
1978	71,856	1,892		14,952	3,672	92,372
1979	49,608	984		27,096	8,220	85,908
1980	33,370	714		21,636	9,504	65,224
1981	45,096	1,248		25,656	11,256	83,256
1982	46,108	1,128		22,656	14,556	84,448
1983	47,040	708		20,748	9,456	77,952
1984	62,643	1,050		31,488	14,004	109,185
1985	37,452	462		22,254	8,544	68,712
1986	48,744	606		25,740	10,572	85,662
1987	60,525	576		21,222	10,332	92,655
1988	81,724	912		27,440	14,064	124,140
1989	66,470	816		26,134	12,552	105,972
1990	50,642	1,051		44,520	10,548	106,761
1991	62,672	1,320		29,160	11,532	104,684
1992	54,288	1,164		35,380	15,180	106,012
1993	39,210	774		35,988	13,118	89,090
1994	54,750	702		26,580	15,768	97,800
1995	42,784	602		34,020	14,844	92,250
1996	34,087	242		18,880	6,518	59,727
1997	13,662	30		28,836	5,820	48,348
1998	26,488	18		23,712	7,896	58,114
Ten Year Average (1988-1997)	50,029	761		30,694	11,994	93,478

a Number of permits that made deliveries times the number of hours in the period.

Appendix A.6. Estimated exvessel value of the Kuskokwim Area commercial salmon fishery, 1964-1998.

<u>Year</u>	<u>Gross Value of Catch to Fishermen</u>	<u>Permits Fished<sup>a</sup></u>	<u>Average Income</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,489	811	15,431
1989	5,171,860	824	6,277
1990	4,894,580	824	5,940
1991	3,971,423	820	4,843
1992	5,295,912	814	6,506
1993	3,962,890	807	4,911
1994	5,201,611	797	6,526
1995	4,209,752	829	5,078
1996	2,900,603	713	4,068
1997	\$1,058,808	702	1,508
1998	1,634,495	707	2,312
Ten year Average (1988-1997)	\$4,918,193	\$794	\$6,109

a Permit holders that made at least one delivery

Appendix A.7. Historical salmon escapement data from selected Kuskokwim Area projects, 1976-1998.

Year	Operating Period	Chinook	Sockeye	Chum	Pink <sup>a</sup>	Coho
<b>Kogruklu River Weir</b>						
BEG		10,000		30,000		25,000
1976	06/29 to 07/31	5,579	2,326	8,117	0	<sup>b</sup>
1977	07/14 to 07/27	1,945 <sup>b</sup>	1,637 <sup>b</sup>	19,444	2	<sup>b</sup>
1978	06/28 to 07/31	13,667	1,670	48,125	2	<sup>b</sup>
1979	07/01 to 07/24	11,338	2,628	18,599	1	<sup>b</sup>
1980	07/01 to 07/11	6,572 <sup>b</sup>	3,200 <sup>b</sup>	41,777	1	<sup>b</sup>
1981	06/27 to 10/05	16,655	18,066	57,365	6	11,455
1982	07/09 to 09/14	10,993	17,297	64,077	19	37,796
1983	06/23 to 09/27	2,992 <sup>b</sup>	1,176 <sup>b</sup>	9,407 <sup>b</sup>	0	8,538
1984	06/19 to 09/15	4,928	4,133	41,484	0	27,595
1985	07/06 to 09/24	4,619	4,359	15,005	0	16,441
1986	06/29 to 09/07	5,038	4,224	14,693	0	22,506
1987	07/15 to 09/24	4,063 <sup>b</sup>	<sup>b</sup>	17,422 <sup>b</sup>	0	22,821
1988	07/05 to 09/17	8,505	4,397	39,540	0	13,512
1989	07/07 to 08/24	11,940 <sup>b</sup>	5,811 <sup>b</sup>	39,548	0	<sup>b</sup>
1990	06/28 to 09/07	10,218	8,406	26,765	1	6,132 <sup>b</sup>
1991	07/04 to 09/15	7,850	16,455	24,188	4	9,933
1992	07/01 to 08/21	6,755	7,540	34,105	11	26,057 <sup>b</sup>
1993	07/02 to 09/06	12,332	29,358	31,899	0	20,517 <sup>b</sup>
1994	07/02 to 09/14	15,227	14,192 <sup>b</sup>	46,192 <sup>b</sup>	23	34,695
1995	07/02 to 09/06	20,630	10,996	31,265	2	27,856
1996	06/29 to 09/15	14,199	15,381	48,494	6	50,555
1997	06/28 to 09/21	13,285	13,062	7,937	0	12,312
1998	07/18 to 09/19	11,869 <sup>b</sup>	16,769 <sup>b</sup>	36,424 <sup>b</sup>	1 <sup>b</sup>	24,344
<b>Aniak River Sonar</b>						
BEG				250,000 <sup>c</sup>		
<i>Non user-configurable, one-bank expanded estimates 1980 - 1995</i>						
1980	06/22 to 07/30	56,469		1,169,470		
	08/16 to 09/12					81,556
1981	06/16 to 08/06	42,060		589,286		
1982	06/21 to 08/01	33,864		442,461		
1983	06/18 to 07/28	4,911		129,367		
1984	06/16 to 07/30			266,976		
1985	06/22 to 07/28			253,051		
1986	06/26 to 07/24			209,080		
1987	06/22 to 07/31			193,013		
1988	06/22 to 07/31			401,511		
1989	06/21 to 07/24			243,922		
1990	06/23 to 08/06			232,260		
1991	06/29 to 07/29			314,166		
1992	06/22 to 07/29			84,269		
1993	06/24 to 07/28			13,870		
1994	06/28 to 07/28			388,163		
1995	06/23 to 07/23			<sup>d</sup>		
<i>User-configurable, two-bank estimates, 1996-1997</i>						
BEG				250,000 <sup>c</sup>		
1996	06/21 to 07/28			302,106		
1997	06/16 to 08/03			262,522		
1998	06/24 to 07/31			279,430		

- continued -

Year	Operating Period	Chinook	Sockeye	Chum	Pink	Coho
<b>Kwethluk River</b>						
<i>Weir</i>						
1992	06/18 to 09/12	9,675	1,316	30,596	45,952	45,605
<i>Tower</i>						
1996	06/22 to 07/27	7,859	2,075	27,462	2,899 <sup>b</sup>	180 <sup>b</sup>
1997	06/22 to 08/12	10,505	1,400	10,780	1,009 <sup>b</sup>	1,110 <sup>b</sup>
1998	07/24 to 08/18	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
<b>Tuluksak River Weir</b>						
1991	06/12 to 09/18	697	34	7,675	391	4,651
1992	06/24 to 09/10	1,083	129	11,183	2,458	7,501
1993	06/17 to 09/10	2,218	88	13,804	210	8,328
1994	06/29 to 09/11	2,922	94	15,707	3,450	8,213
<b>George River Weir</b>						
1996	06/21 to 07/26	7,487	98	17,570	644 <sup>b</sup>	173 <sup>b</sup>
1997	06/09 to 09/15	7,820	445	5,940	0	8,937
1998	06/22 to 07/07	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
<b>Takotna River Tower</b>						
1995	07/07 to 07/31	<sup>b</sup>	0	1,685 <sup>b</sup>	0	0 <sup>b</sup>
1996	06/15 to 07/26	402	0	2,806	0	0 <sup>b</sup>
1997	06/15 to 07/26	1,167	0	1,785		
1998	06/20 to 07/07	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
<b>Tatlawiksuk River Weir</b>						
1998	06/18 to 07/07					
<b>Middle Fork Goodnews River Tower/Weir</b>						
<b>BEG</b>		<b>3,500</b>	<b>25,000</b>	<b>15,000</b>		
<i>Counting Tower, 1981 - 1991</i>						
1981	06/13 to 08/15	3,688	49,108	21,827	1,327 <sup>b</sup>	356 <sup>b</sup>
1982	06/23 to 08/03	1,395	56,255	6,767	13,855 <sup>b</sup>	91 <sup>b</sup>
1983	06/11 to 07/28	6,022	25,813	15,548	34 <sup>b</sup>	0 <sup>b</sup>
1984	06/15 to 07/31	3,260	32,053	19,003	13,744 <sup>b</sup>	249 <sup>b</sup>
1985	06/27 to 07/31	2,831	24,131	10,367	144 <sup>b</sup>	282 <sup>b</sup>
1986	06/16 to 07/24	2,092	51,069	14,764	8,133 <sup>b</sup>	163 <sup>b</sup>
1987	06/22 to 07/30	2,272	28,871	17,517	62 <sup>b</sup>	62 <sup>b</sup>
1988	06/23 to 07/30	2,712	15,799	20,799	6,781 <sup>b</sup>	6 <sup>b</sup>
1989	06/29 to 07/31	1,915	21,186	10,380	24 <sup>b</sup>	1,212 <sup>b</sup>
1990	06/19 to 07/24	3,636	31,679	6,410	3,378 <sup>b</sup>	0 <sup>b</sup>
<i>Weir, 1991 - 1998</i>						
1991	06/29 to 08/24	1,952	47,397	27,525	1,694 <sup>b</sup>	1,978 <sup>b</sup>
1992	06/29 to 08/25	1,903	27,268	22,023	23,030 <sup>b</sup>	150 <sup>b</sup>
1993	06/22 to 08/18	2,317	26,044	14,472	253 <sup>b</sup>	1,374 <sup>b</sup>
1994	06/23 to 08/08	3,856	55,751	34,849	38,705 <sup>b</sup>	309 <sup>b</sup>
1995	06/19 to 08/28	4,836 <sup>a</sup>	39,009	33,699	330 <sup>b</sup>	5,415 <sup>b</sup>
1996	06/19 to 08/23	2,930	58,264	40,450	14,509 <sup>b</sup>	9,699 <sup>b</sup>
1997	06/11 to 09/17	2,937	35,530	17,296	940	9,619
1998	07/04 to 09/13	4,584	47,951	28,905	10,367	35,441
<b>Kanektok River Tower</b>						
1996	7/2-7/13; 7/20-7/25	6,827 <sup>b</sup>	71,637 <sup>b</sup>	70,617 <sup>b</sup>		
1997	06/11 to 08/21	16,731	96,348	51,180	7,872 <sup>b</sup>	23,172 <sup>b</sup>
1998	07/23 to 08/17	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>

<sup>a</sup> Pink salmon can pass freely through the Kogrukluk River weir.<sup>b</sup> No counts or incomplete count as project was not operated during a significant portion of the species' migration.<sup>c</sup> Aniak River sonar counts after 1983 represent multiple species, however, chum salmon are assumed to be the dominant species during the operational period.<sup>d</sup> Reliable escapement estimates are not available from Aniak River sonar for 1995.<sup>e</sup> The original Aniak River sonar BEG of 250,000 fish counts has been carried forward to the user configurable project, but the BEG will be reassessed as more information is gathered.

Appendix A.8. Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967-1998.

Year	Average Weight (lb)					Average Price (\$)				
	Chinook	Sockeye	Chum	Pink	Coho	Chinook	Sockeye	Chum	Pink	Coho
1967	27.8	7.4	7.0	<sup>a</sup>	5.9	0.13	0.05	0.04	<sup>a</sup>	0.09
1968	23.8	6.2	7.9	4.0	7.2	0.16	0.10	0.04	0.05	0.09
1969	19.6	6.2	5.8	3.6	7.3	0.19	0.15	0.07	0.06	0.10
1970	18.9	5.4	6.1	3.3	7.3	0.20	0.21	0.08	0.08	0.14
1971 <sup>b</sup>	26.2	6.9	6.4	<sup>a</sup>	6.1	0.17	0.10	0.08	<sup>a</sup>	0.13
1972	24.7	<sup>a</sup>	6.5	<sup>a</sup>	6.4	0.20	<sup>a</sup>	0.08	<sup>a</sup>	0.16
1973	26.7	<sup>a</sup>	6.8	<sup>a</sup>	5.8	0.25	<sup>a</sup>	0.19	<sup>a</sup>	0.26
1974	17.1	6.3	6.8	4.1	7.5	0.46	0.34	0.25	0.23	0.27
1975	14.9	<sup>a</sup>	6.4	<sup>a</sup>	8.2	0.54	<sup>a</sup>	0.26	<sup>a</sup>	0.31
1976 <sup>c</sup>	17.0	6.7	7.0	3.5	7.8	0.64	0.43	0.27	0.25	0.40
1977	22.7	8.3	7.3	3.9	7.8	1.15	0.45	0.45	0.25	0.65
1978	24.2	6.5	8.9	3.9	7.1	0.50	0.49	0.32	0.12	0.40
1979	16.6	6.9	7.0	3.9	7.9	0.66	0.53	0.37	0.11	0.75
1980	14.1	6.7	6.4	3.6	6.9	0.47	0.31	0.24	0.12	0.64
1981	17.8	7.2	7.5	3.5	6.4	0.84	0.61	0.23	0.11	0.63
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.22	0.05	0.53
1983	18.8	6.8	7.4	3.5	6.8	0.54	0.51	0.33	0.05	0.39
1984	16.4	6.6	6.7	3.2	7.7	0.89	0.52	0.28	0.07	0.55
1985	17.0	7.0	7.1	3.6	7.5	0.71	0.59	0.25	0.05	0.51
1986	17.0	7.2	6.8	3.4	6.4	0.80	0.70	0.25	0.05	0.60
1987	15.2	7.5	6.8	3.7	7.2	1.10	1.30	0.27	0.10	0.73
1988	14.1	7.3	6.9	3.4	7.2	1.30	1.42	0.40	0.15	1.25
1989	16.6	7.2	6.8	3.4	7.3	0.75	1.20	0.26	0.05	0.55
1990	15.1	6.7	6.9	3.2	6.5	0.56	1.05	0.26	0.12	0.62
1991	15.3	6.9	6.3	3.4	6.5	0.56	0.67	0.31	0.12	0.45
1992	13.4	7.0	6.8	3.9	7.3	0.66	0.90	0.32	0.06	0.45
1993	14.3	7.1	6.5	3.4	6.6	0.62	0.70	0.40	0.25	0.58
1994	15.6	6.9	6.6	3.6	7.6	0.51	0.53	0.21	0.08	0.57
1995	17.3	6.9	6.9	3.7	7.2	0.60	0.71	0.18	0.12	0.41
1996	15.7	7.2	7.2	3.8	8.0	0.26	0.40	0.11	0.12	0.25
1997	16.2	7.1	7.3	2.7	7.5	0.28	0.42	0.12	0.10	0.33
1998	14.2	6.8	6.9	3.8	7.8	0.27	0.53	0.13	0.10	0.32
10-Year Average (1988 - 97)	15.4	7.0	6.8	3.5	7.2	0.61	0.80	0.26	0.12	0.55

<sup>a</sup> Information unavailable.<sup>b</sup> Information on price per pound was not available for District 5.<sup>c</sup> Information was not available for District 4.

Appendix A.9. Maximum, mean, and minimum number of permits used in a single period by district, 1962-1998.

Year	District 1			District 2			District 4			District 5		
	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.
1962	190	121	25				32	19	7		Closed	
1963	103	17	1	17	10	2	30	13	1		Closed	
1964	113	30	1	30	4	1	29	15	1		Closed	
1965	164	43	1	5	3	1	31	13	1		Closed	
1966	172	122	61	1	1	1	12	8	1		Closed	
1967	208	144	10	4	2	1	19	8	1		Closed	
1968	262	164	2				78	38	8	17	13	5
1969	274	161	1	11	2	1	119	51	1	28	21	10
1970	320	198	22	11	6	3	75	48	21	25	16	5
1971	355	117	5	20	14	2	48	36	3	11	9	8
1972	341	149	28	12	10	8				12	9	5
1973	372	234	3	18	11	1	70	42	17	17	10	5
1974	444	272	25							40	23	7
1975	483	280	12				106	47	13	30	20	10
1976	495	357	174	55	33	11	99	44	5	35	13	4
1977	487	380	204	83	54	24	172	70	7	21	15	5
1978	509	390	72	24	12	3	123	38	3	24	15	5
1979	549	456	179	33	27	20	126	63	12	27	19	6
1980	482	421	319	37	23	12	101	56	3	35	22	9
1981	541	442	278	151	42	11	106	69	30	38	24	10
1982	499	414	302	47	7	10	107	67	5	30	25	7
1983	547	442	323	34	24	9	134	70	10	62	30	11
1984	542	411	39	33	17	8	165	82	34	47	38	29
1985	530	446	262	15	11	6	191	84	7	47	34	12
1986	600	489	234	27	9	3	216	86	2	52	31	19
1987	607	513	132	22	16	13	253	105	48	75	41	23
1988	640	583	408	21	17	13	202	73	9	68	39	22
1989	679	509	126	22	17	14	140	77	51	65	39	10
1990	653	614	534	18	16	14	218	106	1	58	27	1
1991	662	589	512	19	17	16	227	81	4	50	28	1
1992	653	577	374	21	15	9	187	86	19	91	34	17
1993	654	556	274	17	16	13	219	94	10	80	40	10
1994	606	501	157	17	13	6	171	69	13	88	34	2
1995	617	469	219	16	7	1	239	87	41	68	32	16
1996	541	351	194	6	3	1	120	65	41	40	28	13
1997	513	455	353	3	3	2	178	78	4	42	21	7
1998	496	392	154	3	2	0	116	64	25	37	23	14



Appendix A.10. Kuskokwim Area subsistence Chinook salmon harvest by community, 1960 - 1998.

Community	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Kipnuk	248	11	123	75	a						
Kwigillingok	250	35	43	106	339	a	250	957	70		220
Kongiganak	b	b	b	b						385	891
Tuntutuliak	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195	3,558
Eek				c	c	2,921	4,572	2,566	2,038	2,065	1,882
Kasigluk & Eek					1,857	3,123					
Kasigluk	135	1,215	127	1,302	c	c	1,032	2,766	1,485	2,888	3,931
Nunapitchuk	683	2,042	848	1,874	636	490	2,213	1,926	1,750	2,279	4,680
Atmaultluak	b	b	b	b	b	b	b	b	b	b	1,205
Napakiak	1,830	2,573	2,191	3,148	2,677	2,872	3,658	3,895	2,468	3,546	4,960
Napaskiak	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227	3,446
Oscarville	1,968	282	75	309	339	688	322	1,127	393	457	542
Bethel	1,923	4,150	1,378	7,019	4,114	3,371	8,046	13,925	6,205	7,472	17,026
Kwethluk	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187	7,932
Akiachak	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,755	2,602	7,022
Akiak	1,865	3,159	906	2,869	2,495	1,345	3,670	3,660	1,822	1,275	3,290
Tuluksak	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131	1,995
Lower Kalskag	961	571	c	c	710	c	c	c	1,502	2,102	2,146
Upper Kalskag	667	1,049	c	c	1,143	c	c	c	1,619	1,623	734
Kalskags Comb.			805	2,661		1,395	3,379	3,567			
Aniak	1,057	688	185	602	1,104	c	2,072	1,280	517	1,406	2,136
Aniak <sup>d</sup>					642						
Chuathbaluk	64	54	10	30	74	c	139	217	34	180	219
Napaimute	20	16	44	52	134	a	78	60	94	19	22
Crooked Creek	747	518	561	859	1,358	374	1,446	585	77	541	684
Georgetown							12		0	9	2
Red Devil	c	40	c	c	c	c			111	142	232
Sleetmute	c	222	c	c	c	c	303	343	207	267	161
Sleetmute <sup>e</sup>	465	262	144	228	314	79					
Kasheglok <sup>f</sup>							10				
Stony River	435	25	31		299	79	636	303	176	2,187	105
Lime Village										50	15
Mcgrath							300	25			
Takotna											
Nikolai											
Telida											
Quinhagak								1,349	2,756		
Goodnews Bay											
Platinum											
Total	18,887	28,934	13,582	34,482	29,017	24,697	49,325	61,262	35,698	40,617	69,612

-continued-

Community	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Kipnuk <sup>a</sup>						75	382	75			
Kwigillingok <sup>a</sup>	200	10									
Kongiganak	41					122	361				
Tuntutullak	1,841	3,214	2,859	1,577	3,492	4,807	2,470	1,656	2,268	2,545	4,446
Eek	1,969		1,981	2,356	2,110	3,232	2,675	1,807	2,003	1,557	1,731
Kasigluk	1,645	1,292	1,864	1,411	1,713	1,613	1,324	608	1,142	1,704	3,377
Nunapitchuk	1,978	2,496	2,663	1,165	2,092	2,578	2,622	2,178	2,109	2,612	2,918
Atmautluak	548	864	1,106	382	1,042	1,159	1,015	966	2,242	1,288	1,247
Napakiak	1,868	2,009	1,763	1,224	2,864	3,330	2,702	2,140	2,191	2,582	3,017
Napaskiak	1,916	1,578	2,048	900	2,303	3,566	1,989	2,122	2,085	3,160	2,911
Oscarville	570	196	586	180	891	623	672	349	629	477	495
Bethel	8,731	8,371	8,898	4,631	11,688	13,215	9,408	6,905	11,564	12,591	15,367
Kwethluk	5,564	5,137	3,444	2,694	3,179	4,193	5,563	3,172	6,919	7,627	6,167
Akiachak	4,818	3,872	2,592	1,726	3,534	4,915	5,407	2,951	4,818	5,405	3,094
Akiak	2,688	1,899	1,895	1,292	2,837	3,076	2,880	1,850	3,567	3,355	2,386
Tuluksak	1,280	1,318	1,322	883	1,338	1,411	2,906	1,906	1,489	2,807	2,446
Lower Kalskag	2,355	2,604	1,309	1,586	2,755	4,536	1,750	1,951	2,821	3,917	3,271
Upper Kalskag	601	401	938	463	1,752	1,413	2,813	1,253	1,590	1,889	1,171
Aniak	1,076	2,105	1,030	1,952	1,391	1,490	4,991	1,331	2,634	2,750	3,102
Chuathbaluk	179	261	942	674	594	657	1,507	1,238	2,189	1,507	841
Napaimute	17	20	13	6	16	420	176	144	149	90	45
Crooked Creek	291	183	269	650	238	264	619	488	728	654	512
Georgetown							66			93	
Red Devil	135	182	138	205	623	195	324	153	488	255	298
Sleetmute	181	69	504	269	256	356	684	300	755	220	728
Kashegelo <sup>k</sup>						156	233	92			
Stony River	402	95	287	439	761	620	33	182	171	332	233
Lime Village	2,119				100	33			38		
McGrath									581		
Takotna									65		
Nikolai									60		500
Telida											
Quinhagak							2,012	2,328	1,420	1,940	2,562
Goodnews Bay							574		228	498	1,309
Platinum									110	192	100
Total	43,013	38,176	38,451	26,665	47,569	58,055	58,158	38,145	57,053	62,047	64,274

-continued-

## Appendix A.10. (Page 3 of 4)

Community	1982	1983	1984	1985	1986	1987	1988 <sup>1</sup>	1989	1990	1991	1992
Kipnuk <sup>a</sup>	60							54	108	80	
Kwigillingok <sup>a</sup>											9
Kongiganak	52			235			585	1,412	1,442	778	904
Tuntutuliak	1,984	2,523	3,519	2,644	2,452	2,522	2,741	3,781	4,044	4,143	3,524
Eek	2,578	2,040		1,436			2,212	1,580	4,920	2,360	2,232
Kasigluk	3,115			2,054			1,367	2,173	3,167	2,955	94
Nunapitchuk	2,577	2,688		2,019	3,410	3,372	2,297	3,170	3,199	4,106	3,575
Atmautluak	1,752			1,559			1,131	1,227	2,569	1,784	1,422
Napakiak	3,500	2,047		1,805		2,760	3,091	3,710	4,158	2,543	3,328
Napaskiak	2,872			2,155		2,907	3,898	4,699	4,972	3,864	4,133
Oscarville	523			916		745	415	1,591	898	1,422	122
Bethel	13,516	8,492	11,066	6,940	11,984	8,107	15,038	24,655	19,641	28,817	17,196
Kwethluk	5,897		6,732	4,937	5,824	8,779	10,976	7,562	9,218	7,511	6,504
Akiachak	4,468		5,588	3,254		4,871	9,563	5,504	7,168	5,657	4,163
Akiak	2,745		3,413	2,975		3,683	3,706	4,811	5,178	3,247	3,207
Tuluksak	2,220	1,671	2,286	2,749		3,712	3,289	3,791	1,878	3,351	2,382
Lower Kalskag	2,594		3,242	1,707	1,666		3,024	3,337	2,494	3,947	2,269
Upper Kalskag	963		657	605	587		859	1,256	1,558	1,105	1,366
Aniak	2,071	3,174	1,847	1,828	4,624	2,131	4,071	3,406	3,189	3,261	3,955
Chuathbaluk	1,491			1,102			34	403	1,674	791	933
Napaimute	138			53							
Crooked Creek	515			218			618	451	929	947	472
Red Devil	273			176			263	189	273	168	328
Sleetmute	242		154	745			433	420	711	770	801
Stony River	419			167			315	692	498	586	233
Lime Village							341	105	240	60	
McGrath	160	830	730	59			440	418	1,231	880	1,038
Takotna							100	62	62	0	0
Nikolai	778	750	795	615			136	716	560	421	605
Telida								1			0
Quinhagak	2,402	2,542	3,109	2,341	2,682	3,663	3,690	3,542	6,013	3,693	3,447
Goodnews Bay	1,185	1,004	597	399	513	640	289	419	351	894	318
Platinum	51	62	32	27	42	176	21	48	188	23	56
Mekoryuk <sup>a</sup>								0	0	0	0
Newtok <sup>a</sup>							14	5	1	0	
Nightmute <sup>a</sup>							17	0	3	20	
Toksook Bay <sup>a</sup>							81	127	143	25	49
Tununak <sup>a</sup>							52	5	0	15	
Other											21
Total	61,141	51,020 <sup>h</sup>	60,668 <sup>h</sup>	45,720	54,256 <sup>h</sup>	71,804 <sup>h</sup>	75,107	85,322	92,678	90,224	68,665

-continued-

## Appendix A.10. (Page 4 of 4).

Community	1993	1994	1995	1996	1997	1998
Kipnuk <sup>a</sup>	348	150				119
Kwigillingok <sup>a</sup>	80	7		15		100
Kongiganak	781	1,271	843	830	1,609	1,250
Tuntutuliak	3,633	4,679	4,023	4,027	3,730	4,008
Eek	2,619	2,917	3,535	2,568	2,253	2,131
Kasigluk	548	694	392	579	880	541
Nunapitchuk	3,810	4,746	4,400	3,234	4,086	4,934
Atmautluak	1,818	1,819	1,918	1,801	1,768	1,452
Napakiak	3,972	3,545	3,902	3,784	2,873	3,504
Napaskiak	5,671	6,356	4,984	4,453	4,887	5,452
Oscarville	1,475	1,385	1,438	996	512	981
Bethel	22,083	24,515	29,568	20,783	21,253	23,963
Kwethluk	9,181	9,262	8,931	9,183	6,872	7,940
Akiachak	7,231	8,081	6,571	5,209	7,414	6,507
Akiak	4,280	4,759	4,118	4,569	3,378	3,311
Tuluksak	3,755	4,534	4,333	3,143	5,627	3,701
Lower Kalskag	3,930	3,976	5,321	2,870	3,549	2,041
Upper Kalskag	1,679	1,340	1,396	1,351	1,107	1,244
Aniak	4,618	3,413	3,422	3,204	3,794	3,508
Chuathbaluk	1,447	1,043	2,615	880	1,290	810
Crooked Creek	771	968	934	864	944	772
Red Devil	487	379	425	337	452	262
Sleetmute	1,767	1,327	885	1,230	1,171	947
Stony River	445	359	559	597	863	445
Lime Village	41	216	144	48	59	241
McGrath	567	1,052	800	1,203	974	769
Takotna	0	0		0		2
Nikolai	475	449	979	305	232	330
Telida						
Quinhagak	3,368	3,995	2,746	3,075	3,433	4,041
Goodnews Bay	628	712	858	403	437	713
Platinum	80	72	25	12	12	5
Mekoryuk <sup>a</sup>	0	6		0		1
Newtok <sup>a</sup>	0	2				
Nightmute <sup>a</sup>		8				
Toksook Bay <sup>a</sup>	128	341	94	45	47	48
Tununak <sup>a</sup>	5	0				40
Chefornak <sup>a</sup>						2
Other						
Total	91,721	98,378	100,159	81,598	85,506	86,115

Blanks indicate missing data.

a Data collected, combined with unspecified village or villages.

b Village not yet founded.

c Data collected, but reported with another village.

d Aniak, Chuathbaluk and Russian Mission.

e Sleetmute to Red Devil.

f Kashegelo and Holitna.

g Reported catch only.

Beginning in 1988, estimate based on new formula, data not comparable to previous years.

Beginning in 1988, estimate based on new formula, data not comparable to previous years.

Appendix A.11. Kuskokwim Area subsistence sockeye salmon harvest by community, 1985 - 1998.

Community	1985	1986	1987	1988 <sup>c</sup>	1989	1990	1991	1992	1993	1994	1995
Kipnuk <sup>a</sup>					402	175	136		90	132	
Kwigillingok <sup>a</sup>								0	140	5	
Kongiganak	130			830	658	423	533	905	705	702	530
Tuntutuliak	1,498	288	991	600	1,173	1,954	1,768	1,894	955	3,185	1,134
Eek	241			336	170	1,177	489	671	406	461	283
Kasigluk	1,138			376	235	810	1,421	81	122	275	165
Nunapitchuk	1,447	905	1,187	884	1,026	1,098	2,277	2,273	2,545	1,555	882
Atmautluak	1,308			320	1,143	1,501	881	1,304	1,387	796	1,099
Napakiak	1,242		1,439	1,087	1,752	1,375	1,176	1,315	1,150	1,627	959
Napaskiak	1,181		2,199	1,120	721	1,227	2,673	2,428	3,495	1,933	1,605
Oscarville	942		438	1,752	404	153	711	35	932	324	414
Bethel	3,409	7,730	3,810	5,614	7,316	6,392	17,669	7,173	10,503	8,563	8,190
Kwethluk	5,584	5,423	3,845	5,190	2,414	4,055	3,723	1,829	3,790	3,742	2,504
Akiachak	3,182		3,532	4,890	2,420	3,176	4,123	3,095	4,545	3,323	2,019
Akiak	1,368		1,883	1,378	2,492	1,739	1,708	1,458	3,558	1,786	643
Tuluksak	1,620		1,733	1,493	2,314	1,120	3,595	2,034	2,492	1,393	1,244
Lower Kalskag	948	783		1,581	767	851	1,092	467	2,339	950	681
Upper Kalskag	187	1,182		345	338	287	276	333	349	298	55
Aniak	2,116	2,652	2,101	1,078	959	1,356	2,031	1,180	1,578	571	975
Chuathbaluk	1,797			44	215	1,178	1,246	471	823	995	472
Napaimute	125										
Crooked Creek	1,218			327	436	1,556	998	489	831	512	192
Red Devil	205			437	356	445	426	315	717	311	620
Sleetmute	1,351			898	776	1,060	1,164	855	1,609	1,158	1,083
Stony River	585			195	1,084	835	1,912	1,462	1,488	802	1,342
Lime Village					5,653	2,333	956	0	2,800	1,760	700
McGrath			0	0	0	0	0	0	0	0	0
Takotna			0	0	0	0	0	0	0	0	
Nikolai			0	0	0	0	0	0	0	0	0
Telida				0	0			0			
Quinhagak	106	423	1,067	1,261	633	1,951	1,772	1,264	1,082	1,000	573
Goodnews Bay	562	860	834	898	710	970	1,132	669	784	669	219
Platinum	142	83	121	167	151	153	150	158	51	101	34
Mekoryuk <sup>a</sup>				1	0	50	1	0	1	87	
Newtok <sup>a</sup>					10	3	0		0	20	
Nightmute <sup>a</sup>					0	10	210			15	
Toksook Bay <sup>a</sup>					277	242	105	1	66	228	5
Tununak <sup>a</sup>					83	7	50		30	0	
Other <sup>a</sup>								1	1		
Total	33,632	20,239 <sup>b</sup>	25,180 <sup>b</sup>	33,102	37,088	39,662	56,404	34,159	51,363	39,279	28,622

-continued-

## Appendix A.11. (Page 2 of 2)

Community	1996	1997	1998
Kipnuk <sup>a</sup>			107
Kwigillingok <sup>a</sup>	10		125
Kongiganak	722	1,128	888
Tuntutuliak	1,526	2,048	1,275
Eek	478	584	382
Kasigluk <sup>a</sup>	588	499	53
Nunapitchuk	1,735	2,330	2,250
Atmautluak	1,456	724	1,050
Napakiak	1,083	1,455	1,705
Napaskiak	2,446	2,329	1,617
Oscarville	212	78	288
Bethel	7,112	10,868	8,134
Kwethluk	4,035	3,581	4,036
Akiachak	2,607	3,014	2,654
Akiak	1,449	1,398	1,478
Tuluksak	1,075	1,558	1,490
Lower Kalskag	1,144	1,455	574
Upper Kalskag	294	251	245
Aniak	1,277	1,124	1,151
Chuathbaluk	661	881	248
Crooked Creek	304	350	716
Red Devil	977	697	346
Sleetmute	1,304	1,458	1,398
Stony River	1,218	1,607	433
Lime Village	500	660	2,782
McGrath	0	20 <sup>d</sup>	
Takotna	0	0	
Nikolai	0	0	
Telida			
Quinhagak	400	556	1,490
Goodnews Bay	411	472	483
Platinum <sup>a</sup>	7	137	25
Mekoryuk <sup>a</sup>	0		21
Newtok <sup>a</sup>			
Nightmute <sup>a</sup>			
Toksook Bay <sup>a</sup>	5	8	101
Tununak <sup>a</sup>			20
Chefornak <sup>a</sup>			13
Other			
Total	35,036	41,270	37,578

Blanks indicate missing data.

<sup>a</sup> Reported harvest only.

<sup>b</sup> Estimated total based on sampled villages.

<sup>c</sup> Beginning in 1988, estimate based on new

formula, data not comparable to previous years.

<sup>d</sup> McGrath residents sometimes travel to areas downriver to harvest sockeye.



Appendix A.12. Kuskokwim Area subsistence Coho salmon harvest by community, 1985 - 1998.

Community	1985	1986	1987	1988 <sup>c</sup>	1989	1990	1991	1992	1993	1994	1995
Kipnuk <sup>a</sup>					200	460	30		25	185	
Kwigillingok <sup>a</sup>								0	80	0	
Kongiganak	88			1,146	562	413	540	544	502	566	605
Tuntutuliak	371	1,692	760	754	508	1,135	729	761	820	441	365
Eek	406			291	349	1,620	343	531	206	426	347
Kasigluk	1,763			906	772	958	1,769	174	228	387	518
Nunapitchuk	513	1,084	696	898	469	573	1,167	2,226	321	781	641
Atmautluak	326			337	971	350	254	518	426	411	566
Napakiak	836		959	588	1,757	1,700	597	1,237	590	920	390
Napaskiak	415		629	1,503	1,130	922	754	866	783	2,012	580
Oscarville	155		40	50	430	43	136	0		49	
Bethel	6,094	19,351	8,077	8,291	22,390	19,342	28,136	15,902	13,764	12,258	19,906
Kwethluk	3,041	3,545	2,537	5,240	3,736	3,928	2,380	2,325	1,838	1,816	1,304
Akiachak	967		286	7,927	1,890	1,621	2,393	2,108	1,351	1,531	677
Akiak	1,270		1,294	1,577	4,959	1,591	2,231	1,137	1,315	1,110	501
Tuluksak	1,723		337	1,537	1,483	946	1,903	1,544	412	285	531
Lower Kalskag	596	2,211		158	981	375	510	469	778	845	718
Upper Kalskag	105	759		136	688	300	493	931	354	184	167
Aniak	1,552	1,051	2,302	1,903	2,640	1,484	1,143	1,844	1,091	1,682	1,265
Chuathbaluk	393			72	272	813	93	349	366	795	84
Napaimute	211										
Crooked Creek	290			89	530	886	277	413	409	581	381
Red Devil	846			672	1,591	866	1,132	1,160	1,812	994	1,557
Sleetmute	1,330			1,776	1,009	1,023	1,557	1,132	880	649	1,075
Stony River	395			161	611	423	502	744	512	505	1,083
Lime Village				1,055	2,025	538	336	300	618	960	246
McGrath				790	537	2,408	882	2,780	1,989	2,558	2,225
Takotna					40	0	0	0	0	0	
Nikolai	550			530	328	73	83	173	267	119	545
Telida					60			0			
Quinhagak	67	41	125	4,317	3,787	4,174	3,232	2,958	2,152	2,739	2,561
Goodnews Bay	210			1,072	830	1,556	1,789	1,163	1,197	435	296
Platinum	11	8	43	90	77	90	39	190	29	77	9
Mekoryuk <sup>a</sup>					106	52	130	2	53	87	
Newtok <sup>a</sup>					15	4	0		0	0	
Nightmute <sup>a</sup>					70	0	20			0	
Toksook Bay <sup>a</sup>					35	46	1	15	57	116	22
Tununak <sup>a</sup>					9	0	0		70	0	
Other <sup>a</sup>							39				
Total	24,524	29,742 <sup>b</sup>	18,085 <sup>b</sup>	43,866	57,847	50,713	55,581	44,496	35,295	36,504	39,165

-continued-

## Appendix A.12. (Page 2 of 2)

Community	1996	1997	1998
Kipnuk <sup>a</sup>			85
Kwigillingok <sup>a</sup>	5		40
Kongiganak	421	618	275
Tuntutuliak	1,339	669	935
Eek	389	80	306
Kasigluk <sup>a</sup>	368	518	140
Nunapitchuk	1,310	872	427
Atmautluak	537	531	425
Napakiak	600	168	749
Napaskiak	398	658	540
Oscarville	19	60	2
Bethel	12,929	15,108	11,294
Kwethluk	3,195	1,193	1,731
Akiachak	850	441	477
Akiak	972	846	674
Tuluksak	1,116	434	879
Lower Kalskag	1,022	652	347
Upper Kalskag	360	781	812
Aniak	2,671	1,494	1,308
Chuathbaluk	395	217	55
Crooked Creek	171	261	392
Red Devil	1,274	1,391	425
Sleetmute	846	419	301
Stony River	571	450	429
Lime Village	0	277	776
McGrath	919	753	924
Takotna	0		3
Nikolai	64	141	113
Telida			
Quinhagak	1,467	1,264	1,702
Goodnews Bay	293	343	312
Platinum <sup>a</sup>	59	54	19
Mekoryuk <sup>a</sup>	3		178
Newtok <sup>a</sup>			
Nightmute <sup>a</sup>			
Toksook Bay <sup>a</sup>	135	21	97
Tununak <sup>a</sup>			60
Chefornak <sup>a</sup>			7
Others			
Total	34,698	30,714	27,239

Blanks indicate missing data.

<sup>a</sup> Reported harvest only.

<sup>b</sup> Estimated total based on sampled villages.

<sup>c</sup> Beginning in 1988, estimate based on new formula, data not comparable to previous years.

Appendix A.13. Kuskokwim Area subsistence chum salmon harvest by community, 1985 - 1998.

Community	1985	1986	1987	1988 <sup>c</sup>	1989	1990	1991	1992	1993	1994	1995
Kipnuk <sup>a</sup>					0	540	205		601	214	
Kwigillingok <sup>a</sup>								0	200	5	
Kongiganak	671			1,473	1,967	980	1,036	1,524	811	1,340	1,275
Tuntutuliak	4,346	2,734	5,385	4,700	5,068	6,250	4,755	6,052	2,899	5,232	3,488
Eek	401			1,323	972	3,090	814	1,397	244	624	815
Kasigluk	4,199			3,541	3,007	3,406	3,137	26	374	537	457
Nunapitchuk	4,346	4,676	4,621	7,331	6,923	5,240	6,055	8,229	4,854	4,587	4,297
Atmautluak	4,440			4,695	3,014	4,006	2,394	3,183	1,345	1,455	3,466
Napakiak	3,686		2,784	4,535	7,068	8,389	2,340	4,401	2,281	4,096	3,084
Napaskiak	5,810		6,832	11,623	13,079	8,166	6,582	6,061	3,622	5,605	4,271
Oscarville	1,294		1,135	2,461	1,341	925	1,141	29	566	676	1,018
Bethel	9,260	14,778	7,974	17,442	25,581	18,436	22,770	14,908	9,172	12,341	15,821
Kwethluk	6,866	9,736	7,636	21,352	10,128	11,102	5,497	7,647	3,491	6,102	6,050
Akiachak	5,931		4,355	17,749	7,747	9,133	5,994	5,771	3,492	6,286	4,074
Akiak	6,724		3,837	6,699	13,000	8,235	6,668	5,907	7,549	4,599	1,878
Tuluksak	6,064		3,466	7,046	9,796	5,845	5,695	4,798	3,834	2,476	2,609
Lower Kalskag	4,637	2,538		8,232	4,932	4,212	2,886	2,758	3,062	2,758	1,455
Upper Kalskag	1,855	3,684		3,317	3,427	1,321	2,357	2,843	578	864	1,351
Aniak	8,804	5,905	5,751	11,628	10,404	9,089	3,492	7,870	2,900	2,612	3,566
Chuathbaluk	3,782			450	2,051	4,510	1,912	2,502	2,895	1,615	1,807
Napaimute	414										
Crooked Creek	2,888			768	779	2,884	1,367	904	715	649	358
Red Devil	1,021			3,168	1,376	1,466	1,236	1,523	1,004	1,220	882
Sleetmute	3,689			4,873	1,813	1,874	1,862	3,151	681	1,533	1,758
Stony River	722			3,405	1,352	1,132	602	1,335	775	932	1,375
Lime Village				913	2,100	2,500	715	0	508	2,080	920
McGrath				639	1,276	2,839	1,068	2,854	590	1,294	1,486
Takotna				200	250	56	0	0	0	0	
Nikolai	2,900			2,404	1,221	882	495	818	353	293	301
Telida					15			0			
Quinhagak	901	808	1,084	1,065	1,568	3,234	1,593	1,833	1,008	1,452	686
Goodnews Bay	339	188	371	405	620	193	144	921	188	425	152
Platinum	9	3	207	43	164	139	5	85	0	45	3
Mekoryuk <sup>a</sup>				500	2,915	1,067	1,178	0	808	2,337	
Newtok <sup>a</sup>					20	4	0		0	0	
Nightmute <sup>a</sup>					30	35	60			7	
Toksook Bay <sup>a</sup>					86	224	103	246	296	660	239
Tununak <sup>a</sup>					16	65	150		30	0	
Other <sup>a</sup>							3	1			
Total	95,999	142,930 <sup>b</sup>	70,709 <sup>b</sup>	153,980	145,106	131,469	96,308	99,576	61,726	76,951	68,942

-continued-

## Appendix A.13. (Page 2 of 2)

Community	1996	1997	1998
Kipnuk <sup>a</sup>			114
Kwigillingok <sup>a</sup>	30		250
Kongiganak	1,331	902	1,643
Tuntutuliak	5,852	2,877	3,774
Eek	923	649	787
Kasigluk <sup>a</sup>	1,196	1,278	218
Nunapitchuk	5,833	2,794	5,389
Atmautluak	2,672	1,484	1,916
Napakiak	4,249	1,458	4,556
Napaskiak	4,983	2,589	4,227
Oscarville	1,552	35	420
Bethel	16,403	8,790	12,057
Kwethluk	11,870	3,554	4,786
Akiachak	4,993	1,768	2,467
Akiak	4,640	1,725	2,231
Tuluksak	3,167	2,887	3,224
Lower Kalskag	3,357	1,487	977
Upper Kalskag	1,621	405	487
Aniak	8,447	1,747	5,023
Chuathbaluk	2,089	1,244	1,027
Crooked Creek	347	311	2,561
Red Devil	787	551	565
Sleetmute	1,215	417	981
Stony River	443	591	897
Lime Village	500	251	964
McGrath	206	111	1,462
Takotna	10		15
Nikolai	249	65	519
Telida			
Quinhagak	930	600	1,448
Goodnews Bay	214	133	285
Platinum <sup>a</sup>	5	0	31
Mekoryuk <sup>a</sup>	0		2,176
Newtok <sup>a</sup>			
Nightmute <sup>a</sup>			
Toksook Bay <sup>a</sup>	124	273	171
Tununak <sup>a</sup>			
Cheformak <sup>a</sup>			17
Other			
Total	90,238	40,976	67,665

Blanks indicate missing data.

<sup>a</sup> Reported harvest only.

<sup>b</sup> Estimated total based on sampled villages.

<sup>c</sup> Beginning in 1988, estimate based on new formula, data not comparable to previous years.

# APPENDIX B

Appendix B.1. Kuskokwim River distances.<sup>a</sup>

Location	Distance from the Mouth		Distance from Bethel	
	Kilometer	Miles	Kilometer	Miles
Popokamiut				
(Lower boundary District 1)	-3	-2	-129	-80
Kuskokwim River Mouth				
60.80 N, 162.42 W	0	0	-125	-78
Eek Island, Southernmost tip,				
(Lower boundary District 1)	19	12	-106	-66
Apokak Slough				
(Lower boundary District 1)	35	22	-90	-56
Eek River	39	24	-87	-54
Kwegooyuk	42	26	-84	-52
Kinak River	48	30	-78	-48
Tuntutuliak Village	56	35	-87	-54
Kialik River	59	37	-66	-41
Fowler Island	83	52	-42	-26
Johnson River	93	58	-32	-20
Napakiak Village	104	65	-21	-13
Napaskiak Village	115	71	-12	-7
Oscarville Village	115	71	-11	-7
Bethel City	125	78	0	0
Gweek River	145	90	20	12
Kwethluk Village	159	99	34	21
Akiachak Village	169	105	43	27
Kasigluk River	173	108	48	30
Kisaralik River	175	109	50	31
Akiak Village	190	118	64	40
Mishevik Slough,	212	132	87	54
Tuluksak Village	218	136	93	58
Nelson Island	220	137	95	59
(District 1 Boundary), Bogus Creek	234	146	109	68
High Bluffs	264	164	139	86
Boundary of District 2	295	183	170	105
Mud Creek Slough	297	185	172	107
Kalskag Village	309	192	184	114
Aniak Village, Aniak River	362	225	237	147
Chuathbaluk Village	375	233	250	155
(Upper boundary District 2)				
Kolmakof River	395	246	270	168
Napaimiut Village	410	255	285	177

(continued)

Location	Distance from the Mouth		Distance from Bethel	
	Kilometer	Miles	Kilometer	Miles
Holokuk River	415	258	290	180
Oskawalik River	449	279	324	201
Crooked Creek Village	466	290	341	212
Georgetown Village, George River	497	309	372	231
Red Devil Village	526	327	401	249
Sleetmute village	539	335	414	257
Holitna River	540	336	415	258
Stony River Village	585	364	460	286
Stony River	587	365	462	287
Swift River	611	380	486	302
Tatlawiksuk River	616	383	491	305
Devil's Elbow	645	401	520	323
Vinasale	740	460	615	382
McGrath Village	815	507	690	429
Middle Fork	889	553	764	475
Big River	801	560	776	482
Pitka Fork	920	572	795	494
Medra Village	928	577	803	499
South Fork	931	579	806	501
East Fork	943	586	818	508
North Fork	943	586	818	508
Nikolai Village	999	621	874	543
Swift Fork	1,136	706	1,011	628
Telida Village	1,184	736	1,059	658
Highpower Creek	1,200	746	1,075	668
Fish Creek	1,284	798	1,159	720
North Fork Lake	1,334	829	1,209	751
Top of Kuskokwim Drainage	1,498	931	1,373	853

- a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart. Some locations are not on the mainstem of the Kuskokwim River, as a result their mileages appear to be out of sequence since they are listed in the order of the turn off.



Appendix B.2 Utilization of chinook salmon in the Kuskokwim River, 1960-1998.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test Fishery Harvest	Total Utilization	10-Year Average
1960	5,969	18,887		24,856	
1961	18,918	28,934		47,852	
1962	15,341	13,582		28,923	
1963	12,016	34,482		46,498	
1964	17,149	29,017		46,166	
1965	21,989	24,697		46,686	
1966	25,545	49,325	285	75,155	
1967	29,986	59,913	766	90,665	
1968	34,278	32,942	608	67,828	
1969	43,997	40,617	833	85,447	56,008
1970	39,290	69,612	857	109,759	64,498
1971	40,274	43,242	756	84,272	68,140
1972	39,454	40,396	756	80,606	73,308
1973	32,838	39,093	577	72,508	75,909
1974	18,664	27,139	1,236	47,039	75,997
1975	22,135	48,448	704	71,287	78,457
1976	30,735	58,606	1,206	90,547	79,996
1977	35,830	56,580	1,264	93,674	80,297
1978	45,641	36,270	1,445	83,356	81,850
1979	38,966	56,283	979	96,228	82,928
1980	35,881	59,892	1,033	96,806	81,632
1981	47,663	61,329	1,218	110,210	84,226
1982	48,234	58,018	542	106,794	86,845
1983	33,174	47,412	1,139	81,725	87,767
1984	31,741	56,930	231	88,902	91,953
1985	37,889	43,874	79	81,842	93,008
1986	19,414	51,019	130	70,563	91,010
1987	36,179	67,325	384	103,888	92,031
1988	55,716	70,943 <sup>c</sup>	576	127,235	96,419
1989	43,128	82,098	543	125,769	99,373
1990	53,504	85,499	512	139,515	103,644
1991	37,778	85,627	117	123,522	104,976
1992	46,872	64,702	1,380	112,954	105,592
1993	8,735	89,290	2,483	100,508	107,470
1994	16,211	95,411	1,937	113,559	109,936
1995	30,846	97,193	1,421	129,460	114,697
1996	7,419	78,729	247	86,395	116,281
1997	10,441	81,557	332	92,330	115,125
1998	44,192	81,265	210	125,667	114,968
10-Yr. Ave.					
(1988-1997)	31,065	83,105	955	115,125	

<sup>a</sup> Districts 1 and 2; also includes harvests in District 3 from 1960 to 1965.

<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>c</sup> Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Appendix B.3. Peak aerial survey counts of chinook salmon in indexed Kuskokwim River spawning tributaries, 1975 - 1998<sup>a</sup>.

Year	Lower Kuskokwim				Middle Kuskokwim						Upper Kuskokwim		
	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogrukuk Weir	Cheeneetnuk	Salmon (Pitka)
1975			118			94		17	71	1,114			
1976				139		177		126	204	2,571	5,579	1,197	1,146
1977		2,290		291			562	60	276			1,399	1,978
1978	1,613	1,732	2,417	403			289			2,766	13,667	267	1,127
1979		911						113			11,338		699
1980	2,378			725			1,186	250	123				1,177
1981		1,783	672		9,074		894				16,655		1,474
1982	230				2,645		185	42	120	521	10,993		419
1983	188	471	731	129	1,909		231	33	52	1,069		243	586
1984		273	157	93	1,409					299	4,926	1,177	577
1985	1,118	629		135				135	61		4,619	1,002	625
1986					909		336	100		850	5,038	381	
1987	1,739	975		60		193	516	208	193	813		317	
1988	2,255	766	840	188	945		244	57	80		8,506		501
1989	1,042	1,157	152		1,880	994	631				11,940		446
1990	1,983	1,295	631	166	1,255	537	596	143	113		10,218		
1991	1,312	1,002		342	1,564	885	583				7,850		
1992					2,284	670	335	64	91	1,822	6,755	1,050	2,555
1993					2,687	1,248	1,082	114	103	1,573	12,332	678	1,012
1994		848	1,021		1,848	1,520	1,218				15,227	1,206	1,010
1995			1,243		3,174	1,215	1,442	181	289	2,787	20,630	1,565	1,911
1996					3,496		983	85			14,199		
1997			439	173	2,187	855	980	322	1,470	2,093	13,280	345	
1998		27	457		2,239	353							
BEG	1,460 <sup>b</sup>	1,200 <sup>c</sup>	1,000 <sup>c</sup>	400 <sup>c</sup>	1,500 <sup>c</sup>	670 <sup>b</sup>	600 <sup>c</sup>	107 <sup>b</sup>	108 <sup>b</sup>	2,000 <sup>c</sup>	10,000 <sup>c</sup>	1,002 <sup>b</sup>	1,300 <sup>c</sup>

<sup>a</sup> Estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good, or excellent viewing conditions.<sup>b</sup> Median of years 1975 through 1994.<sup>c</sup> Formally established BEG (Buklis 1993).

Appendix B.4. Historical daily CPUE for chinook salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5/30	0	0													
5/31	0	0													
6/01	0	0				0	0		0	3	3	3	3		
6/02	1	0			3	0	2	0	0	4	2	3	10	0	0
6/03	0	0	0		0	0	0	0	0	10	3	1	5	2	4
6/04	0	0	3	0	0	0	1	0	0	3	2	1	17	5	6
6/05	0	0	1	5	2	0	1	1	0	8	11	3	12	4	7
6/06	0	0	1	3	0	0	1	3	2	11	15	2	19	0	7
6/07	2	0	5	5	3	2	3	6	0	5	2	10	19	2	0
6/08	3	0	0	16	22	7	4	2	3	8	5	15	6	7	3
6/09	6	0	1	9	14	9	5	1	6	29	5	2	15	2	2
6/10	5	0	0	20	5	15	8	0	7	16	2	10	20	15	8
6/11	5	0	0	18	21	4	14	3	21	3	0	10	25	3	2
6/12	13	0	0	22	18	9	14	0	22	20	7	17	19	30	2
6/13	3	0	0	13	11	11	6	2	21	14	16	16	33	10	7
6/14	5	0	1	21	3	27	2	2	18	10	52	10	45	1	9
6/15	17	0	9	10	8	19	9	1	11	22	15	3	16	9	13
6/16	14	0	20	11	8	7	11	3	21	17	13	3	26	24	2
6/17	4	0	14	54	21	21	6	3	24	37	14	11	25	37	11
6/18	26	0	4	14	7	35	13	12	9	30	2	24	8	26	3
6/19	14	0	15	13	13	19	26	6	5	29	22	31	11	49	6
6/20	14	1	3	18	25	16	9	15	9	30	13	8	15	39	18
6/21	5	7	17	23	16	14	12	6	9	27	20	29	22	48	10
6/22	12	0	15	30	13	17	19	4	0	31	29	11	6	34	7
6/23	4	3	14	26	16	23	9	6	6	13	12	22	10	21	21
6/24	11	0	13	9	21	21	24	6	14	21	3	25	13	7	25
6/25	4	4	1	38	8	26	34	7	12	8	10	22	7	20	24
6/26	4	0	5	20	10	48	31	4	11	2	2	35	6	14	14
6/27	6	3	8	25	14	50	13	2	9	5	11	12	3	12	11
6/28	10	8	0	15	5	11	25	7	13	5	3	5	9	0	20
6/29	4	9	3	18	3	3	21	16	11	7	15	19	3	1	14
6/30	1	4	3	12	3	22	0	9	6	12	7	15	4	3	25
7/01	6	12	7	15	12	11	2	9	11	3	5	13	0	2	4
7/02	14	1	6	9	1	3	9	8	6	4	3	3	2	1	14
7/03	3	9	7	3	5	9	17	6	7	3	5	9	0	4	9
7/04	11	6	3	8	5	7	20	6	10	3	3	9	2	3	11
7/05	4	9	3	7	8	10	5	1	3	0	5	7	4	4	4
7/06	6	8	1	9	0	2	6	2	0	0	5	0	4	6	3
7/07	0	3	1	15	0	9	8	3	0	2	11	3	2	6	6
7/08	3	5	4	0	0	4	14	2	3	2	2	5	2	2	4
7/09	7	5	3	1	0	5	5	0	0	4	3	6	2	0	2
7/10	2	1	0	3	0	4	0	2	3	2	0	0	3	6	6
7/11	0	2	2	2	0	0	0	0	4	2	0	2	2	8	2
7/12	1	1	0	2	0	1	4	0	4	2	0	0	0	2	0
7/13	1	1	0	2	0	0	2	2	4	0	0	0	2	0	0
7/14	0	0	1	1	8	0	2	1	0	0	0	0	0	0	0
7/15	1	2	0	0	0	0	2	1	0	0	0	0	0	0	0
7/16	8	0	0	0	8	0	2	2	4	0	0	0	0	0	0
7/17	0	1	0	3	6	1	2	0	5	2	0	0	0	2	0
7/18	2	0	0	0	2	2	0	2	6	0	2	0	0	0	0
7/19	0	0	0	14	0	1	0	2	3	2	2	0	0	0	4
7/20	3	0	0	1	0	5	0	0	0	0	0	2	0	2	0
7/21	0	0	2	2	0	1	0	0	0	0	0	0	0	2	0
7/22	0	0	2	0	0	6	4	0	0	0	0	0	0	2	0

- continued -

## Appendix B.4 (page 2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
7/24	1	0	3	0	1	0	2	0	0	0	0	0	0	2	2
7/25	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
7/26	2	0	0	0	2	0	4	0	0	0	0	0	2	0	0
7/27	0	2	0	4	2	0	0	0	0	0	0	4	0	0	0
7/28	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
7/29	0	2	0	0	0	0	4	0	0	0	0	0	0	0	0
7/30	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0
7/31	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0
8/01	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/02	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8/03	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
8/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/06	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8/07	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0
8/08	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
8/09	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8/10	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8/11	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0
8/12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8/13	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0
8/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/15	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/19	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
8/20	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
8/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/24	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
8/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8/27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.

Appendix B.5. Historical daily cumulative CPUE for chinook salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5/30	0	0													
5/31	1	0													
6/01	1	0				0	0		0	3	3	0	3		
6/02	3	0			3	0	2	0	0	7	5	3	13	0	3
6/03	3	0	0		3	0	2	0	0	17	7	3	18	2	7
6/04	3	0	3	0	3	0	3	0	0	20	9	4	35	7	13
6/05	3	0	4	5	5	0	4	1	0	28	20	7	47	11	20
6/06	3	0	6	8	5	0	6	4	2	39	35	9	66	11	27
6/07	5	0	10	13	8	2	8	10	2	45	37	19	84	13	27
6/08	7	0	10	29	30	8	13	11	5	52	42	34	90	20	30
6/09	13	0	12	38	44	17	17	13	11	81	47	36	105	22	31
6/10	18	0	12	59	49	32	25	13	18	97	48	46	125	36	39
6/11	23	0	12	77	71	36	39	16	39	100	48	55	150	39	40
6/12	35	0	12	98	89	45	53	16	61	120	55	73	169	69	42
6/13	38	0	12	112	100	56	58	17	82	134	71	89	202	79	48
6/14	43	0	13	133	103	83	61	19	100	143	123	99	247	80	57
6/15	60	0	22	143	111	102	69	20	111	166	138	102	262	89	70
6/16	74	0	42	154	119	109	81	23	132	182	151	105	288	113	71
6/17	78	0	56	208	140	130	87	26	156	220	164	116	313	150	82
6/18	104	0	59	222	147	165	100	38	165	250	166	140	322	176	85
6/19	118	0	74	235	160	185	126	43	170	279	188	171	333	224	91
6/20	132	1	77	253	185	201	135	59	179	309	201	179	348	263	109
6/21	137	8	94	277	201	215	146	64	188	336	221	208	370	312	119
6/22	149	8	109	306	214	231	165	68	188	367	251	219	376	346	126
6/23	153	11	123	333	231	255	174	74	194	380	263	241	386	366	147
6/24	164	11	136	342	252	276	198	80	208	401	266	266	399	374	172
6/25	169	15	138	379	260	302	232	87	220	409	276	288	406	394	196
6/26	173	15	143	400	270	350	263	91	230	410	278	323	412	408	210
6/27	178	18	151	425	284	401	276	93	239	416	289	335	415	419	221
6/28	188	26	151	440	289	412	301	99	252	420	292	340	423	419	241
6/29	192	35	154	458	292	415	322	116	263	427	307	359	426	421	255
6/30	194	38	156	471	295	437	322	125	268	440	314	374	430	424	280
7/01	200	51	163	486	307	448	324	133	279	443	318	387	430	426	284
7/02	214	52	169	495	308	451	333	141	285	446	322	390	432	427	298
7/03	217	60	176	498	313	461	350	147	293	450	327	399	432	430	307
7/04	228	67	179	506	318	468	370	153	303	453	330	408	434	433	319
7/05	232	76	182	513	326	477	375	154	306	453	334	415	438	437	323
7/06	238	85	183	522	326	479	381	156	306	453	339	415	442	443	326
7/07	238	87	184	537	326	488	388	159	306	455	350	418	444	449	332
7/08	240	93	189	537	326	492	403	160	309	457	352	423	445	451	336
7/09	248	98	191	538	326	496	408	160	309	461	355	429	447	451	338
7/10	250	99	191	541	326	500	408	162	313	464	355	429	450	456	343
7/11	250	102	193	543	326	500	408	162	317	466	355	431	452	464	345
7/12	251	103	193	545	326	501	411	162	321	468	355	431	452	466	345
7/13	252	105	193	548	326	501	414	163	325	468	355	431	453	466	345
7/14	252	105	194	549	334	501	416	165	325	468	355	431	453	466	345
7/15	253	106	194	549	334	501	418	166	325	468	355	431	453	466	345
7/16	261	106	194	549	341	501	420	168	329	468	355	431	453	466	345
7/17	261	107	194	551	347	503	422	168	335	470	355	431	453	468	345
7/18	263	107	194	551	349	504	422	170	341	470	357	431	453	468	345
7/19	263	107	194	566	349	505	422	172	344	473	359	431	453	468	349
7/20	266	107	194	567	349	510	422	172	344	473	359	433	453	470	349
7/21	266	107	196	569	349	511	422	172	344	473	359	433	453	472	349
7/22	266	107	198	569	349	518	425	172	344	473	359	433	453	474	349

- continued -

## Appendix B.5 (page 2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	266	107	198	572	349	518	425	172	344	473	359	433	453	474	349
7/24	267	107	201	572	350	518	427	172	344	473	359	433	453	476	351
7/25	267	107	201	572	350	518	427	172	344	473	359	433	455	476	351
7/26	268	107	201	572	352	518	431	172	344	473	359	433	456	476	351
7/27	268	109	201	577	354	518	431	172	344	473	359	438	456	476	351
7/28	268	109	201	577	354	518	433	172	344	473	359	438	456	476	351
7/29	268	111	201	577	354	518	438	172	344	473	359	438	456	476	351
7/30	268	111	201	577	358	518	438	172	344	473	359	440	456	476	351
7/31	271	111	201	577	358	518	438	172	344	473	359	440	458	476	351
8/01	273	111	201	577	358	518	438	172	344	473	359	440	458	476	351
8/02	273	111	201	577	358	519	438	172	344	473	359	440	458	476	351
8/03	273	111	201	578	358	519	438	172	344	473	359	440	458	476	351
8/04	273	111	201	578	358	519	438	172	344	473	359	440	458	476	351
8/05	273	111	201	578	358	519	438	172	344	473	359	440	458	476	351
8/06	273	111	201	578	358	519	439	172	344	473	359	440	458	476	351
8/07	273	111	201	580	358	519	439	172	347	473	359	440	458	476	351
8/08	273	113	201	580	358	519	439	172	347	473	359	440	458	476	351
8/09	273	113	201	580	358	520	439	172	347	473	359	440	458	476	351
8/10	273	113	201	580	358	520	441	172	347	473	359	440	458	476	351
8/11	273	113	201	582	361	520	441	172	347	473	359	440	458	476	351
8/12	273	113	201	582	361	520	441	172	347	473	359	440	458	477	351
8/13	273	113	201	582	361	522	441	172	347	473	359	440	458	478	351
8/14	273	113	201	582	361	522	441	172	347	473	359	440	458	478	351
8/15	273	113	201	582	361	522	443	172	347	473	359	440	458	478	351
8/16	273	113	201	582	361	522	443	172	347	473	359	440	458	478	351
8/17	273	113	201	582	361	522	443	172	347	473	359	440	458	478	351
8/18	273	113	201	582	361	522	443	172	347	473	359	440	458	478	351
8/19	273	113	201	582	361	522	443	172	349	473	359	440	458	478	351
8/20	273	114	201	582	361	523	443	172	349	473	359	440	458	478	351
8/21	273	114	201	582	361	523	443	172	349	473	359	440	458	478	351
8/22	273	114	201	582	361	523	443	172	349	473	359	440	458	478	351
8/23	273	114	201	582	361	523	443	172	349	473	359	440	458	478	351
8/24	273	114	201	582	361	523	443	172	349	473	362	440	458	478	351
8/25	273	114	201	582	361	523	443	172	349	473	362	440	458	478	351
8/26	273	114	201	582	361	523	445	172	349	473	362	440	458	478	351
8/27	273	114	201	582	361	523	445	172	349	473	362	440	458	478	351
8/28	273	114	201	582	361	523	445	172	349	473	362	440	458	478	
8/29	273	114		582	361	523	445	172	349	473	362	440	458		
8/30															
8/31															
9/01															
9/02															
9/03															
9/04															
9/05															
9/06															
9/07															
9/08															
9/09															
9/10															
9/11															

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.



Appendix B.6 Historical cumulative daily percent passage for chinook salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Median
6/01	1	0	0	0	0	0	0	0	0	1	1	0	1			0
6/02	1	0	0	0	1	0	0	0	0	1	1	1	3	0	1	0
6/03	1	0	0	0	1	0	0	0	0	4	2	1	4	1	2	1
6/04	1	0	1	0	1	0	1	0	0	4	2	1	8	1	4	1
6/05	1	0	2	1	1	0	1	1	0	6	6	2	10	2	6	1
6/06	1	0	3	1	1	0	1	2	0	8	10	2	14	2	8	2
6/07	2	0	5	2	2	0	2	6	0	9	10	4	18	3	8	3
6/08	3	0	5	5	8	2	3	7	1	11	12	8	20	4	8	5
6/09	5	0	6	7	12	3	4	7	3	17	13	8	23	4	9	7
6/10	7	0	6	10	14	6	6	7	5	20	13	10	27	8	11	8
6/11	8	0	6	13	20	7	9	9	11	21	13	13	33	8	11	11
6/12	13	0	6	17	25	9	12	9	17	25	15	17	37	14	12	14
6/13	14	0	6	19	28	11	13	10	23	28	20	20	44	16	14	16
6/14	16	0	6	23	29	16	14	11	29	30	34	22	54	17	16	17
6/15	22	0	11	25	31	20	16	12	32	35	38	23	57	19	20	22
6/16	27	0	21	26	33	21	18	13	38	39	42	24	63	24	20	24
6/17	29	0	28	36	39	25	20	15	45	46	45	26	68	31	23	29
6/18	38	0	30	38	41	32	23	22	47	53	46	32	70	37	24	37
6/19	43	0	37	40	44	35	28	25	49	59	52	39	73	47	26	40
6/20	48	1	38	44	51	38	30	34	51	65	56	41	76	55	31	44
6/21	50	7	47	48	56	41	33	37	54	71	61	47	81	65	34	48
6/22	55	7	54	53	59	44	37	40	54	78	69	50	82	72	36	54
6/23	56	9	61	57	64	49	39	43	56	80	73	55	84	77	42	56
6/24	60	9	68	59	70	53	45	46	60	85	73	60	87	78	49	60
6/25	62	13	68	65	72	58	52	51	63	86	76	65	89	82	56	65
6/26	63	13	71	69	75	67	59	53	66	87	77	74	90	85	60	69
6/27	65	15	75	73	79	77	62	54	69	88	80	76	91	88	63	75
6/28	69	23	75	76	80	79	68	58	72	89	81	77	92	88	69	76
6/29	70	30	76	79	81	79	73	67	75	90	85	82	93	88	73	79
6/30	71	34	78	81	82	83	73	72	77	93	87	85	94	89	80	81
7/01	73	44	81	83	85	86	73	77	80	94	88	88	94	89	81	83
7/02	78	45	84	85	85	86	75	82	82	94	89	89	94	89	85	85
7/03	79	53	87	86	87	88	79	86	84	95	90	91	94	90	88	87
7/04	83	59	89	87	88	89	83	89	87	96	91	93	95	91	91	89
7/05	85	67	90	88	90	91	85	90	88	96	92	94	96	91	92	90
7/06	87	74	91	90	90	92	86	91	88	96	94	94	97	93	93	91
7/07	87	77	92	92	90	93	88	92	88	96	97	95	97	94	95	92
7/08	88	81	94	92	90	94	91	93	89	97	97	96	97	94	96	94
7/09	91	86	95	92	90	95	92	93	89	98	98	98	98	94	96	94
7/10	92	87	95	93	90	96	92	94	90	98	98	98	98	95	98	95
7/11	92	89	96	93	90	96	92	94	91	99	98	98	99	97	98	96
7/12	92	90	96	94	90	96	93	94	92	99	98	98	99	97	98	96
7/13	92	92	96	94	90	96	93	95	93	99	98	98	99	97	98	96
7/14	92	92	97	94	92	96	94	96	93	99	98	98	99	97	98	96
7/15	93	93	97	94	92	96	94	97	93	99	98	98	99	97	98	97

- continued -



Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Median
7/16	95	93	97	94	95	96	95	98	95	99	98	98	99	97	98	97
7/17	95	94	97	95	96	96	95	98	96	100	98	98	99	98	98	97
7/18	96	94	97	95	97	96	95	99	98	100	99	98	99	98	98	98
7/19	96	94	97	97	97	97	95	100	99	100	99	98	99	98	99	98
7/20	97	94	97	97	97	98	95	100	99	100	99	99	99	98	99	98
7/21	97	94	98	98	97	98	95	100	99	100	99	99	99	99	99	99
7/22	97	94	99	98	97	99	96	100	99	100	99	99	99	99	99	99
7/23	97	94	99	98	97	99	96	100	99	100	99	99	99	99	99	99
7/24	98	94	100	98	97	99	96	100	99	100	99	99	99	99	100	99
7/25	98	94	100	98	97	99	96	100	99	100	99	99	99	99	100	99
7/26	98	94	100	98	98	99	97	100	99	100	99	99	100	99	100	99
7/27	98	96	100	99	98	99	97	100	99	100	99	99	100	99	100	99
7/28	98	96	100	99	98	99	98	100	99	100	99	99	100	99	100	99
7/29	98	97	100	99	98	99	99	100	99	100	99	99	100	99	100	99
7/30	98	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
7/31	99	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/01	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/02	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/03	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/04	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/05	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/06	100	97	100	99	99	99	99	100	99	100	99	100	100	99	100	99
8/07	100	97	100	100	99	99	99	100	99	100	99	100	100	99	100	100
8/08	100	99	100	100	99	99	99	100	99	100	99	100	100	99	100	100
8/09	100	99	100	100	99	99	99	100	99	100	99	100	100	99	100	100
8/10	100	99	100	100	99	99	100	100	99	100	99	100	100	99	100	100
8/11	100	99	100	100	100	99	100	100	99	100	99	100	100	99	100	100
8/12	100	99	100	100	100	99	100	100	99	100	99	100	100	100	100	100
8/13	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/14	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/15	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/16	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/17	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/18	100	99	100	100	100	100	100	100	99	100	99	100	100	100	100	100
8/19	100	99	100	100	100	100	100	100	100	100	99	100	100	100	100	100
8/20	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
8/21	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
8/22	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
8/23	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
8/24	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/26	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/27	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/28	100	100	100	100	100	100	100	100	100	100	100	100	100	100		100
8/29	100	100	100	100	100	100	100	100	100	100	100	100				100

<sup>a</sup> The boxed areas within each column represent the central 50 percent test-fish catches and the median.

Appendix B.7 Historical daily CPUE for sockeye salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5/30	0	0													
5/31	0	0													
6/01	0	0				0	0		0	0	0	0	0		0
6/02	0	0			0	0	0	0	0	0	0	0	0	0	0
6/03	0	0	0		0	0	0	0	0	0	0	0	0	0	0
6/04	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
6/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/06	0	0	0	3	0	3	0	0	0	0	0	0	3	3	0
6/07	3	0	6	9	0	0	0	0	0	0	0	0	0	0	0
6/08	0	0	8	17	12	0	0	0	0	3	0	0	3	0	0
6/09	0	0	13	13	14	3	0	0	0	3	0	0	9	3	0
6/10	0	0	3	16	12	3	0	0	0	0	0	0	40	0	0
6/11	5	0	21	16	43	20	8	0	0	7	0	0	50	6	0
6/12	0	0	6	112	62	12	3	0	0	6	0	3	20	3	0
6/13	2	0	11	49	47	11	0	3	9	31	0	3	43	6	5
6/14	6	0	6	9	14	27	16	3	13	7	3	7	67	6	6
6/15	0	0	48	42	9	24	14	3	13	3	3	13	53	12	6
6/16	7	0	102	168	7	15	20	0	14	23	0	16	68	61	3
6/17	7	0	49	252	26	15	63	12	48	66	10	3	22	9	14
6/18	22	3	79	69	48	46	16	51	45	41	0	19	33	60	0
6/19	0	13	119	17	98	28	38	11	9	16	55	28	107	31	12
6/20	14	0	34	47	26	19	31	39	15	63	10	6	103	61	15
6/21	5	12	145	76	135	53	15	9	28	136	76	66	136	174	17
6/22	26	11	169	166	135	58	14	43	36	46	29	49	29	147	40
6/23	0	97	63	355	117	36	77	17	39	54	73	22	88	24	138
6/24	31	0	33	142	63	40	60	6	67	90	109	31	124	8	92
6/25	41	135	226	49	29	83	91	9	96	110	36	134	126	86	17
6/26	19	128	198	62	115	26	25	6	19	23	40	74	122	60	45
6/27	48	126	202	34	69	53	43	21	49	21	26	28	95	50	38
6/28	20	117	138	41	42	40	90	39	141	25	23	131	65	7	36
6/29	3	256	20	37	9	35	104	25	108	62	189	61	77	188	98
6/30	18	150	221	164	45	40	6	20	71	428	20	64	20	38	83
7/01	34	190	15	241	91	13	24	28	35	117	13	88	11	40	47
7/02	46	54	98	63	28	11	24	35	36	55	29	69	17	47	137
7/03	24	68	85	36	32	22	65	62	78	14	190	108	62	9	131
7/04	36	33	32	124	54	1	96	36	22	57	93	66	34	20	128
7/05	35	45	42	166	45	5	22	38	6	10	73	128	11	32	42
7/06	23	56	33	12	17	3	3	7	12	32	160	32	9	6	45
7/07	24	58	74	44	11	13	23	7	0	20	35	45	23	56	62
7/08	27	3	21	6	13	15	38	0	13	58	44	30	12	45	120
7/09	17	23	11	30	10	3	29	27	3	6	86	13	46	20	36
7/10	2	6	2	30	5	0	14	6	4	4	29	0	11	23	11
7/11	2	12	9	4	4	2	6	3	7	4	6	7	6	21	3
7/12	2	6	23	3	0	5	4	3	6	0	4	2	8	8	3
7/13	0	5	17	7	0	4	8	3	19	21	0	4	11	4	6
7/14	1	2	13	5	3	0	6	3	23	30	2	2	10	2	4
7/15	3	0	2	3	2	0	8	3	4	9	0	0	2	6	0
7/16	10	9	8	0	0	8	4	0	10	2	0	0	9	4	2
7/17	2	4	6	2	3	1	0	2	4	0	2	0	2	2	4
7/18	5	4	3	0	2	1	0	0	6	0	2	0	0	2	0
7/19	4	3	4	6	0	1	2	0	0	0	0	0	0	8	0
7/20	0	5	4	3	0	0	0	0	0	0	0	4	2	4	2
7/21	2	5	7	0	0	0	0	0	0	2	1	0	0	8	0
7/22	1	8	3	0	1	0	0	2	0	2	2	0	4	0	0

- continued -

## Appendix B.7 (2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	0	3	3	0	0	0	0	2	0	0	0	2	0	2	0
7/24	0	0	0	0	1	0	0	0	0	0	2	0	0	2	0
7/25	2	0	0	0	0	0	0	0	0	0	0	0	2	2	0
7/26	2	2	0	0	0	0	0	0	0	0	0	0	2	4	2
7/27	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
7/28	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0
7/29	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
7/30	0	0	2	0	0	0	1	0	0	0	0	0	0	2	4
7/31	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
8/01	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0
8/02	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
8/03	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0
8/04	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
8/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/06	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
8/07	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
8/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/09	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8/10	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0
8/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/12	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0
8/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/24	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
8/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.

Appendix B.8+A32 Historical cumulative daily CPUE for sockeye salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5/30	0	0	0	0	0										
5/31	0	0	0	0	0										
6/01	0	0	0	0	0	0	0		0	0	0	0	0		
6/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/04	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
6/05	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
6/06	0	0	0	9	0	3	0	0	0	0	0	0	3	3	0
6/07	3	0	6	18	0	3	0	0	0	0	0	0	3	3	0
6/08	3	0	14	35	12	3	0	0	0	3	0	0	6	3	0
6/09	3	0	27	48	27	6	0	0	0	6	0	0	15	6	0
6/10	3	0	30	64	38	9	0	0	0	6	0	0	55	6	0
6/11	8	0	50	80	82	29	8	0	0	14	0	0	105	12	0
6/12	8	0	56	191	143	40	11	0	0	20	0	3	125	15	0
6/13	10	0	68	240	191	51	11	3	9	50	0	6	167	20	5
6/14	16	0	73	249	205	78	27	6	22	57	3	13	234	26	11
6/15	16	0	121	290	214	102	41	9	35	60	6	26	287	38	17
6/16	23	0	223	458	221	117	60	9	49	83	6	42	355	98	20
6/17	30	0	273	710	247	132	123	21	97	149	16	45	377	107	34
6/18	52	3	352	779	296	178	139	71	142	190	16	64	411	167	34
6/19	52	16	471	796	394	207	177	83	151	207	71	92	518	198	46
6/20	66	16	505	843	419	226	207	122	167	269	80	98	621	258	60
6/21	71	28	650	919	554	278	222	130	194	406	156	164	757	432	77
6/22	97	40	819	1,085	690	336	236	173	230	451	185	213	785	580	117
6/23	97	137	882	1,440	807	372	313	190	269	506	258	235	873	604	256
6/24	128	137	915	1,582	869	412	374	196	336	596	368	266	997	612	348
6/25	169	272	1,141	1,631	898	495	464	204	432	705	404	400	1,123	698	365
6/26	188	400	1,339	1,693	1,013	521	489	210	451	728	443	475	1,245	758	410
6/27	236	526	1,541	1,727	1,082	574	532	231	499	749	469	502	1,341	808	448
6/28	256	643	1,679	1,768	1,124	614	622	270	640	774	492	633	1,405	814	484
6/29	259	899	1,699	1,805	1,133	648	726	295	748	836	681	694	1,482	1,002	582
6/30	277	1,049	1,920	1,969	1,178	688	732	315	819	1,264	701	758	1,502	1,040	665
7/01	311	1,239	1,935	2,211	1,269	702	756	343	854	1,380	714	846	1,513	1,080	712
7/02	357	1,293	2,032	2,273	1,297	713	780	378	890	1,435	742	915	1,530	1,127	849
7/03	381	1,361	2,117	2,309	1,329	736	845	440	967	1,449	932	1,023	1,592	1,136	980
7/04	416	1,394	2,149	2,433	1,383	737	941	476	989	1,505	1,025	1,089	1,626	1,156	1,108
7/05	451	1,439	2,191	2,599	1,428	742	963	514	995	1,515	1,097	1,217	1,637	1,188	1,150
7/06	475	1,495	2,224	2,611	1,445	745	966	521	1,008	1,546	1,257	1,249	1,646	1,194	1,195
7/07	498	1,553	2,298	2,655	1,456	759	988	528	1,008	1,566	1,292	1,294	1,669	1,250	1,257
7/08	525	1,556	2,319	2,662	1,469	774	1,027	528	1,020	1,625	1,336	1,324	1,681	1,295	1,377
7/09	542	1,579	2,330	2,691	1,478	777	1,055	555	1,024	1,631	1,422	1,337	1,726	1,315	1,413
7/10	545	1,584	2,332	2,722	1,483	777	1,069	561	1,028	1,635	1,451	1,337	1,738	1,339	1,424
7/11	547	1,597	2,341	2,726	1,488	779	1,076	563	1,034	1,639	1,457	1,343	1,743	1,360	1,427
7/12	549	1,603	2,365	2,729	1,488	784	1,080	566	1,040	1,639	1,461	1,346	1,751	1,368	1,430
7/13	549	1,607	2,382	2,736	1,488	788	1,088	569	1,059	1,660	1,461	1,350	1,763	1,372	1,436
7/14	550	1,609	2,395	2,741	1,491	788	1,093	572	1,082	1,690	1,463	1,352	1,772	1,374	1,440
7/15	553	1,609	2,397	2,744	1,492	788	1,102	575	1,086	1,698	1,463	1,352	1,774	1,380	1,440
7/16	562	1,619	2,404	2,744	1,492	795	1,106	575	1,097	1,700	1,463	1,352	1,783	1,383	1,442
7/17	564	1,622	2,411	2,746	1,496	797	1,106	577	1,101	1,700	1,465	1,352	1,784	1,385	1,446
7/18	569	1,626	2,414	2,746	1,498	798	1,106	577	1,107	1,700	1,468	1,352	1,784	1,387	1,446
7/19	573	1,629	2,418	2,752	1,498	799	1,108	577	1,107	1,700	1,468	1,352	1,784	1,395	1,446
7/20	573	1,635	2,421	2,755	1,498	799	1,108	577	1,107	1,700	1,468	1,357	1,786	1,399	1,448
7/21	575	1,639	2,428	2,755	1,498	799	1,108	577	1,107	1,703	1,469	1,357	1,786	1,406	1,448
7/22	576	1,648	2,431	2,755	1,499	799	1,108	579	1,107	1,705	1,471	1,357	1,790	1,406	1,448

- continued -

## Appendix B.8 (2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	576	1,651	2,434	2,755	1,499	799	1,108	581	1,107	1,705	1,471	1,359	1,790	1,408	1,448
7/24	576	1,651	2,434	2,755	1,500	799	1,108	581	1,107	1,705	1,473	1,359	1,790	1,410	1,448
7/25	578	1,651	2,434	2,755	1,500	799	1,108	581	1,107	1,705	1,473	1,359	1,792	1,412	1,448
7/26	579	1,653	2,434	2,755	1,500	799	1,108	581	1,107	1,705	1,473	1,359	1,794	1,416	1,450
7/27	579	1,653	2,435	2,755	1,500	799	1,108	581	1,107	1,705	1,473	1,359	1,794	1,416	1,452
7/28	579	1,653	2,435	2,755	1,500	799	1,109	581	1,107	1,705	1,473	1,361	1,794	1,416	1,452
7/29	579	1,653	2,437	2,755	1,500	799	1,109	581	1,107	1,705	1,473	1,361	1,794	1,416	1,452
7/30	579	1,653	2,439	2,755	1,500	799	1,111	581	1,107	1,705	1,473	1,361	1,794	1,418	1,456
7/31	579	1,653	2,439	2,755	1,501	799	1,113	581	1,107	1,705	1,473	1,361	1,794	1,418	1,456
8/01	579	1,653	2,441	2,755	1,501	799	1,113	581	1,107	1,705	1,473	1,363	1,794	1,418	1,456
8/02	579	1,653	2,441	2,757	1,501	799	1,113	581	1,107	1,705	1,473	1,363	1,794	1,418	1,456
8/03	579	1,654	2,441	2,759	1,501	799	1,113	581	1,107	1,705	1,473	1,365	1,794	1,418	1,456
8/04	579	1,654	2,441	2,759	1,501	799	1,113	581	1,107	1,705	1,473	1,365	1,794	1,422	1,456
8/05	579	1,654	2,441	2,759	1,501	799	1,113	581	1,107	1,705	1,473	1,365	1,794	1,422	1,456
8/06	579	1,654	2,442	2,759	1,501	799	1,114	581	1,107	1,705	1,473	1,365	1,794	1,422	1,456
8/07	579	1,654	2,442	2,759	1,501	799	1,114	581	1,107	1,705	1,473	1,367	1,794	1,422	1,456
8/08	579	1,654	2,442	2,759	1,501	799	1,114	581	1,107	1,705	1,473	1,367	1,794	1,422	1,456
8/09	579	1,654	2,442	2,759	1,501	799	1,114	581	1,107	1,705	1,473	1,367	1,794	1,424	1,456
8/10	579	1,654	2,444	2,759	1,501	799	1,114	581	1,107	1,705	1,475	1,367	1,794	1,424	1,456
8/11	579	1,654	2,444	2,759	1,501	799	1,114	581	1,107	1,705	1,475	1,367	1,794	1,424	1,456
8/12	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/13	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/14	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/15	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/16	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/17	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/18	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/19	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/20	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/21	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/22	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/23	579	1,654	2,444	2,761	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/24	579	1,654	2,445	2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/25	579	1,654	2,445	2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/26	579	1,654	2,445	2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/27	579	1,654	2,445	2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	1,456
8/28	579	1,654	2,445	2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367	1,794	1,424	
8/29	579	1,654		2,762	1,501	799	1,114	581	1,109	1,705	1,475	1,367			
8/30	579	1,654		2,762		799	1,114	581	1,109	1,705	1,475				
8/31	579			2,762		799	1,114	581	1,109	1,705	1,475				
9/01	579			2,762											
9/02	579			2,762											
9/03	579			2,762											
9/04	579			2,762											
9/05	579			2,762											
9/06	579			2,762											
9/07				2,762											
9/08				2,762											
9/09				2,762											
9/10				2,762											
9/11				2,762											

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.



Appendix B.10 Historical daily CPUE for coho salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/09	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
7/12	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
7/13	0	0	0	0	2	2	0	0	6	7	0	0	8	0	0
7/14	0	0	0	0	0	2	0	0	2	0	0	0	10	0	0
7/15	0	0	2	0	0	2	0	0	0	0	2	0	8	0	0
7/16	2	0	2	0	0	0	0	0	2	0	2	0	17	2	0
7/17	2	2	2	0	4	2	0	0	1	0	0	0	35	0	0
7/18	3	0	2	0	0	4	0	0	7	0	2	0	17	0	0
7/19	7	2	4	0	0	0	4	2	9	9	9	0	122	6	0
7/20	7	4	4	0	4	10	13	6	5	2	0	4	108	8	2
7/21	5	5	10	0	2	7	10	7	3	5	0	0	194	12	0
7/22	5	20	8	7	4	16	7	4	7	24	22	0	120	6	0
7/23	12	0	21	2	0	6	3	6	2	28	6	6	97	10	0
7/24	9	2	54	0	12	6	8	4	4	9	48	2	240	36	4
7/25	16	24	29	0	16	4	2	7	9	6	38	18	675	57	12
7/26	12	21	26	0	8	0	2	2	11	4	11	8	615	31	14
7/27	18	8	74	2	44	2	10	23	10	20	13	11	256	20	8
7/28	29	15	20	2	72	9	43	34	11	71	27	15	170	6	14
7/29	60	40	64	12	28	8	35	42	23	67	26	4	517	31	4
7/30	201	14	54	5	43	37	12	71	25	69	66	22	598	16	27
7/31	154	29	31	5	75	343	10	64	13	73	101	25	482	12	4
8/01	179	50	323	13	43	218	26	42	32	73	75	36	186	58	39
8/02	104	37	101	40	32	447	22	24	17	148	33	30	322	85	53
8/03	312	69	404	93	79	78	21	118	50	302	21	337	38	340	111
8/04	45	60	419	69	42	24	54	124	11	538	13	150	35	276	31
8/05	78	47	253	27	45	159	65	10	11	127	2	102	79	54	44
8/06	169	92	249	42	300	348	78	32	57	318	24	131	26	92	24
8/07	45	182	210	103	370	195	50	20	56	102	178	145	27	14	18
8/08	108	86	86	53	183	54	73	64	115	73	230	32	25	22	22
8/09	76	114	180	34	41	185	118	43	250	34	156	109	120	58	23
8/10	55	124	297	43	106	33	58	42	675	11	190	69	94	44	43
8/11	105	218	87	35	257	111	64	35	420	25	392	69	38	150	15
8/12	98	96	326	189	256	74	210	248	91	66	137	35	39	46	39
8/13	25	75	96	142	68	24	180	91	123	32	64	75	63	67	170
8/14	24	29	64	348	174	17	166	40	128	0	93	186	44	23	188
8/15	113	84	180	205	185	2	258	36	41	9	66	29	56	54	43
8/16	10	68	55	121	58	0	108	20	80	109	72	28	27	49	154
8/17	279	19	48	107	152	15	91	25	78	18	307	44	2	18	68
8/18	304	23	101	52	112	4	86	88	41	33	188	45	19	31	16
8/19	204	8	91	19	35	6	61	35	32	136	22	8	35	16	32
8/20	6	12	30	9	41	14	83	26	137	114	60	13	25	70	52
8/21	28	17	94	16	10	35	39	38	17	27	64	31	6	117	27
8/22	110	0	52	9	74	22	69	20	42	4	19	54	4	71	0
8/23	4	17	136	21	68	11	131	10	53	0	13	26	8	25	14
8/24	8	8	100	25	108	3	40	26	4	4	141	12	14	48	14
8/25	33	12	26	9	121	26	61	14	21	9	81	43	57	35	2
8/26	26	0	43	19	89	10	56	42	13	18	42	27	12	12	0
8/27	24	10	10	32	64	17	39	17	9	10	59	2	0	0	0
8/28	14	34	4	50	9	17	2	18	4	12	19	11	0	4	
8/29	48	12		35	4	6	13	18	2	13	2	4			
8/30	21	0		48		2	8	9	5	5	9				
8/31	24			0		7	0	0	4	2					
9/01	5			20											
9/02	11			23											
9/03	7			27											
9/04	5			23											
9/05	29			22											
9/06	7			24											
9/07				12											
9/08				15											
9/09				7											
9/10				19											
9/11				9											

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.

Appendix B.11 Historical cumulative daily CPUE for coho salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/09	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
7/12	0	0	0	0	0	0	0	0	0	0	3	0	10	0	0
7/13	0	0	0	0	2	2	0	0	6	7	3	0	17	0	0
7/14	0	0	0	0	2	4	0	0	8	7	3	0	27	0	0
7/15	0	0	2	0	2	6	0	0	8	7	5	0	34	0	0
7/16	2	0	4	0	2	6	0	0	10	7	8	0	52	2	0
7/17	3	2	6	0	6	8	0	0	11	7	8	0	86	2	0
7/18	7	2	8	0	6	12	0	0	18	7	10	0	104	2	0
7/19	13	3	11	0	6	12	4	2	27	16	18	0	226	8	0
7/20	21	7	15	0	10	22	17	8	31	18	18	4	334	16	2
7/21	26	12	25	0	12	30	27	15	34	23	18	4	528	27	2
7/22	31	33	33	7	16	46	34	19	40	47	40	4	647	33	2
7/23	43	33	54	9	16	51	37	25	43	75	46	11	745	43	2
7/24	51	35	107	9	28	57	45	29	47	84	95	13	984	79	6
7/25	67	59	136	9	44	61	47	36	55	90	133	31	1,660	136	17
7/26	79	80	163	9	53	61	49	38	66	95	144	39	2,275	167	31
7/27	97	88	236	11	97	63	59	61	76	114	157	50	2,531	187	39
7/28	126	103	256	14	169	72	102	95	86	185	184	65	2,701	193	53
7/29	186	143	320	25	197	80	136	137	110	252	210	69	3,219	224	56
7/30	387	157	374	30	239	117	148	208	135	322	276	91	3,817	240	83
7/31	541	186	405	35	314	460	158	271	148	395	377	116	4,298	251	87
8/01	720	237	727	47	358	678	184	314	179	468	452	151	4,484	309	126
8/02	824	274	828	87	390	1,125	205	337	196	616	486	181	4,806	394	179
8/03	1,136	343	1,233	180	468	1,203	226	455	246	917	507	517	4,844	734	289
8/04	1,182	402	1,652	249	511	1,227	280	579	257	1,455	520	668	4,879	1,011	321
8/05	1,259	450	1,905	276	556	1,386	345	589	268	1,582	522	769	4,958	1,065	365
8/06	1,428	542	2,154	318	856	1,734	423	621	325	1,900	546	900	4,984	1,157	389
8/07	1,473	724	2,363	421	1,226	1,929	473	641	381	2,002	723	1,045	5,011	1,170	407
8/08	1,581	809	2,450	475	1,409	1,983	546	705	496	2,075	953	1,077	5,037	1,192	428
8/09	1,657	924	2,630	509	1,450	2,168	664	748	746	2,108	1,110	1,186	5,157	1,250	452
8/10	1,712	1,047	2,927	551	1,556	2,202	722	790	1,421	2,120	1,300	1,255	5,251	1,294	495
8/11	1,817	1,266	3,014	587	1,813	2,312	786	824	1,841	2,144	1,691	1,324	5,289	1,444	510
8/12	1,915	1,361	3,340	776	2,070	2,386	996	1,072	1,932	2,210	1,828	1,359	5,328	1,491	549
8/13	1,940	1,437	3,436	918	2,138	2,410	1,176	1,163	2,056	2,242	1,892	1,434	5,391	1,558	719
8/14	1,964	1,466	3,501	1,266	2,312	2,427	1,342	1,203	2,183	2,242	1,985	1,620	5,435	1,581	907
8/15	2,077	1,550	3,681	1,470	2,497	2,429	1,600	1,239	2,224	2,252	2,051	1,649	5,491	1,635	950
8/16	2,087	1,619	3,735	1,591	2,555	2,429	1,708	1,259	2,304	2,361	2,123	1,677	5,518	1,685	1,104
8/17	2,366	1,637	3,784	1,699	2,706	2,444	1,798	1,284	2,382	2,379	2,430	1,721	5,520	1,702	1,172
8/18	2,669	1,661	3,885	1,751	2,818	2,448	1,884	1,371	2,422	2,412	2,619	1,766	5,539	1,733	1,188
8/19	2,874	1,669	3,976	1,770	2,853	2,455	1,945	1,406	2,455	2,548	2,640	1,775	5,574	1,749	1,220
8/20	2,880	1,680	4,006	1,779	2,894	2,468	2,029	1,433	2,592	2,662	2,700	1,788	5,599	1,818	1,272
8/21	2,908	1,698	4,100	1,795	2,903	2,503	2,067	1,471	2,609	2,689	2,765	1,819	5,605	1,936	1,299
8/22	3,017	1,698	4,152	1,804	2,978	2,525	2,136	1,491	2,651	2,693	2,784	1,873	5,609	2,006	1,299
8/23	3,021	1,715	4,288	1,825	3,046	2,536	2,267	1,501	2,703	2,693	2,797	1,899	5,616	2,031	1,313
8/24	3,030	1,723	4,388	1,850	3,154	2,539	2,307	1,527	2,707	2,697	2,938	1,911	5,630	2,080	1,326
8/25	3,062	1,734	4,414	1,859	3,275	2,564	2,368	1,540	2,729	2,706	3,019	1,954	5,687	2,114	1,328
8/26	3,088	1,734	4,457	1,878	3,364	2,574	2,424	1,583	2,741	2,724	3,061	1,981	5,699	2,126	1,328
8/27	3,112	1,744	4,467	1,910	3,428	2,591	2,463	1,600	2,750	2,734	3,119	1,983	5,699	2,126	1,328
8/28	3,126	1,778	4,471	1,960	3,437	2,609	2,465	1,618	2,754	2,745	3,138	1,994	5,699	2,130	
8/29	3,175	1,790		1,995	3,441	2,615	2,477	1,636	2,757	2,758	3,141	1,998			
8/30	3,196	1,790		2,043		2,616	2,485	1,645	2,762	2,763	3,150				
8/31	3,219			2,043		2,624	2,485	1,645	2,766	2,765	3,150				
9/01	3,225			2,063											
9/02	3,236			2,086											
9/03	3,243			2,113											
9/04	3,249			2,137											
9/05	3,278			2,159											
9/06	3,285			2,183											
9/07				2,195											
9/08				2,210											
9/09				2,217											
9/10				2,236											
9/11				2,245											

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.



Appendix B.12 Historical cumulative daily percent passage for coho salmon catches in the Bethel test fishery, 1984-1998a

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Median
7/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7/16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7/17	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
7/18	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0
7/19	0	0	0	0	0	0	0	0	1	1	1	0	4	0	0	0
7/20	1	0	0	0	0	1	1	0	1	1	1	0	6	1	0	1
7/21	1	1	1	0	0	1	1	1	1	1	1	0	9	1	0	1
7/22	1	2	1	0	0	2	1	1	1	2	1	0	11	2	0	1
7/23	1	2	1	0	0	2	1	1	2	3	1	1	13	2	0	1
7/24	2	2	2	0	1	2	2	2	2	3	3	1	17	4	0	2
7/25	2	3	3	0	1	2	2	2	2	3	4	2	29	6	1	2
7/26	2	4	4	0	2	2	2	2	2	3	5	2	40	8	2	2
7/27	3	5	5	1	3	2	2	4	3	4	5	2	44	9	3	3
7/28	4	6	6	1	5	3	4	6	3	7	6	3	47	9	4	5
7/29	6	8	7	1	6	3	5	8	4	9	7	3	56	11	4	6
7/30	12	9	8	1	7	4	6	13	5	12	9	5	67	11	6	8
7/31	17	10	9	2	9	18	6	16	5	14	12	6	75	12	7	10
8/01	22	13	16	2	10	26	7	19	6	17	14	8	79	15	9	14
8/02	26	15	19	4	11	43	8	20	7	22	15	9	84	19	13	15
8/03	35	19	28	9	14	46	9	28	9	33	16	26	85	34	22	26
8/04	37	22	37	12	15	47	11	35	9	53	17	33	86	47	24	33
8/05	39	25	43	14	16	53	14	36	10	57	17	38	87	50	27	36
8/06	44	30	48	16	25	66	17	38	12	69	17	45	87	54	29	38
8/07	46	40	53	21	36	74	19	39	14	72	23	52	88	55	31	40
8/08	49	45	55	23	41	76	22	43	18	75	30	54	88	56	32	45
8/09	51	52	59	25	42	83	27	45	27	76	35	59	90	59	34	51
8/10	53	59	65	27	45	84	29	48	51	77	41	63	92	61	37	53
8/11	56	71	67	29	53	88	32	50	67	78	54	66	93	68	38	66
8/12	59	76	75	38	60	91	40	65	70	80	58	68	93	70	41	68
8/13	60	80	77	45	62	92	47	71	74	81	60	72	95	73	54	72
8/14	61	82	78	62	67	93	54	73	79	81	63	81	95	74	68	74
8/15	65	87	82	72	73	93	64	75	80	81	65	83	96	77	71	77
8/16	65	90	84	78	74	93	69	76	83	85	67	84	97	79	83	83
8/17	73	91	85	83	79	93	72	78	86	86	77	86	97	80	88	85
8/18	83	93	87	86	82	93	76	83	88	87	83	88	97	81	89	87
8/19	89	93	89	87	83	94	78	85	89	92	84	89	98	82	92	89
8/20	89	94	90	87	84	94	82	87	94	96	86	89	98	85	96	89
8/21	90	95	92	88	84	95	83	89	94	97	88	91	98	91	98	91
8/22	94	95	93	88	87	96	86	91	96	97	88	94	98	94	98	94
8/23	94	96	96	89	89	97	91	91	98	97	89	95	99	95	99	95
8/24	94	96	98	91	92	97	93	93	98	98	93	96	99	98	100	96
8/25	95	97	99	91	95	98	95	94	99	98	96	98	100	99	100	98
8/26	96	97	100	92	98	98	98	96	99	98	97	99	100	100	100	98
8/27	97	97	100	93	100	99	99	97	99	99	99	99	100	100	100	99
8/28	97	99	100	96	100	99	99	98	100	99	100	100	100	100		100
8/29	99	100		98	100	100	100	99	100	100	100	100				100
8/30	99	100		100		100	100	100	100	100	100					100
8/31	100			100		100	100	100	100	100						100

<sup>a</sup> The boxed areas within each column represent the central 50 percent test-fish catches and the median.

Appendix B.13 Historic daily CPUE for chum salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5/30	0	0													
5/31	0	0													
6/01	0	0				3	0		0	0	0	0	0		
6/02	0	0			0	0	0	0	0	0	10	0	0	0	0
6/03	0	0	0		0	0	0	0	0	0	8	0	0	0	0
6/04	5	0	0	0	0	0	0	0	0	0	3	0	0	3	0
6/05	0	0	6	3	9	3	0	0	0	0	0	0	15	0	0
6/06	0	0	10	12	0	0	3	0	7	3	7	0	29	0	0
6/07	0	0	0	6	3	6	0	0	3	0	3	0	12	0	0
6/08	2	0	8	9	11	10	0	0	3	0	0	0	23	0	0
6/09	10	0	28	15	38	9	0	0	3	0	10	0	35	0	6
6/10	10	0	6	6	29	12	0	0	6	6	0	0	54	0	0
6/11	3	0	9	21	63	3	0	0	12	8	3	6	67	0	0
6/12	15	0	9	13	91	17	3	3	9	0	13	0	65	5	3
6/13	8	3	0	19	87	20	0	0	44	9	28	3	175	0	8
6/14	11	0	9	3	19	7	13	6	21	7	56	6	321	0	3
6/15	5	3	38	10	45	36	0	0	105	13	143	26	204	9	6
6/16	31	3	46	42	26	24	3	0	116	3	59	48	168	17	9
6/17	41	8	121	122	56	4	22	0	55	10	52	51	171	12	3
6/18	75	8	108	41	195	49	20	0	43	35	20	63	187	34	0
6/19	9	65	151	6	160	68	28	0	0	0	263	36	594	14	0
6/20	20	115	64	60	50	44	9	25	33	11	26	80	742	26	0
6/21	52	3	87	24	143	76	30	3	58	44	278	153	820	119	18
6/22	8	25	104	200	251	56	22	9	49	95	125	94	357	53	26
6/23	108	28	203	103	246	79	53	14	53	65	190	111	498	20	190
6/24	167	3	112	48	86	167	77	6	29	126	112	51	665	48	164
6/25	166	52	460	66	16	208	32	9	39	107	10	219	513	59	23
6/26	86	65	177	100	63	111	49	32	43	0	17	157	325	111	39
6/27	109	58	109	87	306	134	168	58	212	7	16	25	90	32	110
6/28	105	24	35	105	109	78	72	50	107	13	7	59	80	0	110
6/29	22	180	6	268	108	122	87	64	130	30	111	146	93	83	296
6/30	59	177	105	246	88	106	32	8	136	153	7	111	63	23	91
7/01	115	77	3	152	382	115	67	30	124	120	10	164	92	50	82
7/02	160	31	70	120	188	66	28	91	43	19	19	144	114	20	230
7/03	66	24	193	34	437	78	200	22	267	125	192	291	67	59	98
7/04	209	5	123	62	469	57	214	33	322	82	141	168	112	20	70
7/05	163	40	309	177	192	182	188	6	189	78	88	214	149	78	53
7/06	48	25	140	389	120	59	26	12	105	39	383	58	128	41	65
7/07	60	93	62	463	27	117	173	12	13	24	245	274	41	129	141
7/08	48	3	68	38	34	65	136	9	139	71	732	271	23	110	234
7/09	52	5	246	272	92	57	61	60	48	31	394	219	32	76	84
7/10	39	0	34	208	148	66	81	46	46	28	253	27	133	33	42
7/11	7	0	87	63	83	3	78	26	48	37	69	98	31	42	11
7/12	16	3	163	53	65	7	74	43	59	62	33	73	37	54	3
7/13	16	10	134	87	63	55	23	21	51	270	108	49	82	45	4
7/14	7	0	25	255	38	35	33	28	49	67	57	66	52	20	1
7/15	91	0	10	61	69	11	24	20	27	140	38	30	121	64	0
7/16	24	6	16	33	82	20	37	12	21	88	32	17	113	52	4
7/17	15	32	43	107	64	17	24	16	23	75	15	15	81	20	0
7/18	14	9	43	125	57	23	59	51	25	53	48	21	42	53	4
7/19	16	19	50	202	16	16	66	16	29	94	26	8	96	33	10
7/20	9	7	36	170	29	29	73	16	4	52	9	38	52	33	14
7/21	18	5	52	23	36	13	57	40	3	51	0	35	57	36	14
7/22	1	12	34	12	10	7	40	57	0	134	82	42	68	15	7

- continued -

## Appendix B.13 (2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	9	6	26	8	6	13	35	33	23	28	38	43	19	14	4
7/24	3	2	29	28	24	0	24	12	6	9	55	27	42	44	4
7/25	8	9	11	41	15	4	8	56	10	0	26	16	25	34	6
7/26	7	6	2	20	13	0	2	8	7	2	9	27	24	20	7
7/27	7	2	3	4	18	0	18	49	8	7	9	17	19	6	6
7/28	3	4	7	6	10	0	35	18	9	4	18	24	6	6	0
7/29	8	10	11	5	13	1	36	36	4	5	11	9	8	16	2
7/30	6	4	5	2	23	0	9	14	6	2	6	2	11	2	12
7/31	1	1	0	1	6	14	2	24	0	6	14	10	2	2	0
8/01	2	0	5	4	5	6	6	8	0	5	16	8	4	8	0
8/02	3	1	0	3	4	8	6	6	15	7	10	2	5	10	0
8/03	3	2	4	9	6	4	6	12	2	2	2	12	0	18	4
8/04	6	8	0	11	3	1	2	10	0	11	2	6	0	14	6
8/05	2	0	0	3	3	0	1	0	0	9	2	2	0	0	0
8/06	0	4	3	4	7	3	23	2	4	2	0	4	0	0	0
8/07	0	6	1	0	19	2	6	2	0	0	4	4	0	2	0
8/08	0	0	0	0	3	0	0	5	0	0	9	0	0	2	2
8/09	0	0	2	2	3	2	4	2	4	0	7	0	0	4	0
8/10	0	36	0	2	4	0	2	3	0	0	2	0	2	2	2
8/11	0	1	0	0	3	0	2	4	2	0	4	2	0	4	0
8/12	0	0	0	0	2	0	4	3	6	0	2	0	0	0	0
8/13	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
8/14	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0
8/15	0	0	2	4	0	0	2	2	0	0	0	0	0	0	0
8/16	0	0	0	1	0	0	2	0	0	0	2	0	0	0	0
8/17	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
8/18	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0
8/19	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
8/20	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
8/21	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8/22	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0
8/23	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/27	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
8/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
8/30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.

Appendix B.14 Historic cumulative daily CPUE for chum salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
0	0	0													
31	0	0													
6/01	0	0				3	0		0	0	0	0	0		
6/02	0	0			0	3	0	0	0	0	10	0	0	0	0
6/03	0	0	0		0	3	0	0	0	0	18	0	0	0	0
6/04	5	0	0	0	0	3	0	0	0	0	21	0	0	3	0
6/05	5	0	6	3	9	6	0	0	0	0	21	0	15	3	0
6/06	5	0	16	16	9	6	3	0	7	3	28	0	45	3	0
6/07	5	0	16	22	12	11	3	0	10	3	31	0	56	3	0
6/08	7	0	24	30	23	22	3	0	13	3	31	0	80	3	0
6/09	17	0	53	45	61	30	3	0	16	3	41	0	115	3	6
6/10	28	0	59	52	90	42	3	0	22	9	41	0	169	3	6
6/11	30	0	68	72	153	45	3	0	34	17	44	6	237	3	6
6/12	45	0	77	86	244	62	6	3	43	17	57	6	301	8	9
6/13	53	3	77	105	331	82	6	3	87	27	86	10	476	8	17
6/14	63	3	86	108	350	90	18	9	108	33	142	16	797	8	20
6/15	68	5	124	117	395	126	18	9	212	46	285	42	1,001	17	26
6/16	100	8	170	159	421	150	21	9	328	49	343	90	1,170	34	34
6/17	141	16	290	281	477	154	43	9	383	59	395	141	1,340	45	37
6/18	216	25	398	322	671	203	63	9	426	93	416	204	1,527	79	37
6/19	225	90	549	328	832	271	91	9	426	93	678	240	2,121	93	37
6/20	245	205	613	388	881	315	100	34	460	105	705	320	2,864	119	37
6/21	297	207	700	412	1,025	391	130	37	518	149	983	473	3,684	238	55
6/22	305	232	804	613	1,276	446	152	46	567	244	1,107	567	4,041	290	80
'23	413	260	1,007	715	1,522	525	205	60	620	310	1,297	678	4,539	310	271
24	580	263	1,119	763	1,608	692	282	66	649	436	1,408	729	5,204	358	434
6/25	746	315	1,579	829	1,624	900	314	74	688	543	1,419	948	5,717	417	457
6/26	832	380	1,756	928	1,687	1,011	363	106	732	543	1,435	1,105	6,042	528	496
6/27	941	438	1,865	1,015	1,993	1,145	531	163	943	550	1,451	1,130	6,132	560	606
6/28	1,045	463	1,901	1,120	2,101	1,223	603	213	1,050	563	1,458	1,190	6,211	560	716
6/29	1,068	643	1,907	1,389	2,210	1,345	690	277	1,180	594	1,569	1,335	6,305	643	1,013
6/30	1,126	820	2,012	1,635	2,298	1,452	722	285	1,316	746	1,575	1,447	6,368	666	1,104
7/01	1,241	896	2,015	1,787	2,680	1,567	789	315	1,440	866	1,585	1,610	6,459	716	1,185
7/02	1,401	928	2,085	1,906	2,868	1,633	817	406	1,483	885	1,604	1,755	6,573	736	1,415
7/03	1,467	952	2,277	1,941	3,306	1,711	1,017	427	1,750	1,010	1,796	2,045	6,641	794	1,513
7/04	1,677	957	2,401	2,003	3,775	1,768	1,231	461	2,072	1,092	1,937	2,213	6,753	815	1,533
7/05	1,840	997	2,709	2,180	3,966	1,950	1,419	466	2,261	1,170	2,025	2,427	6,902	892	1,636
7/06	1,888	1,022	2,850	2,569	4,086	2,009	1,445	478	2,366	1,209	2,408	2,485	7,029	933	1,701
7/07	1,948	1,115	2,912	3,032	4,114	2,126	1,618	490	2,379	1,233	2,653	2,759	7,070	1,061	1,842
7/08	1,996	1,118	2,979	3,070	4,148	2,190	1,754	499	2,518	1,304	3,385	3,029	7,093	1,171	2,076
7/09	2,048	1,123	3,225	3,342	4,240	2,247	1,815	559	2,567	1,335	3,779	3,248	7,125	1,247	2,159
7/10	2,087	1,123	3,260	3,550	4,388	2,314	1,896	605	2,613	1,363	4,031	3,275	7,258	1,280	2,202
7/11	2,093	1,123	3,347	3,612	4,471	2,317	1,975	631	2,661	1,400	4,100	3,373	7,289	1,323	2,213
7/12	2,109	1,126	3,510	3,665	4,536	2,324	2,048	674	2,719	1,461	4,133	3,446	7,326	1,377	2,215
7/13	2,125	1,137	3,644	3,752	4,599	2,379	2,071	695	2,770	1,731	4,241	3,495	7,408	1,421	2,220
7/14	2,132	1,137	3,669	4,007	4,637	2,414	2,104	723	2,820	1,798	4,298	3,561	7,459	1,441	2,220
7/15	2,224	1,137	3,679	4,068	4,706	2,424	2,128	743	2,846	1,938	4,336	3,591	7,581	1,505	2,220
7/16	2,248	1,142	3,696	4,101	4,788	2,445	2,165	755	2,867	2,026	4,368	3,608	7,694	1,556	2,224
7/17	2,262	1,174	3,739	4,208	4,852	2,462	2,190	770	2,890	2,101	4,383	3,623	7,775	1,577	2,224
'18	2,276	1,183	3,782	4,333	4,909	2,485	2,249	821	2,915	2,154	4,431	3,645	7,817	1,630	2,228
19	2,292	1,202	3,831	4,535	4,925	2,501	2,315	837	2,944	2,248	4,457	3,653	7,913	1,662	2,238
7/20	2,301	1,209	3,867	4,706	4,954	2,530	2,388	853	2,948	2,299	4,465	3,690	7,965	1,695	2,252
7/21	2,318	1,214	3,919	4,729	4,990	2,543	2,445	894	2,952	2,350	4,465	3,725	8,022	1,732	2,266
7/22	2,319	1,225	3,953	4,740	4,999	2,551	2,485	951	2,952	2,484	4,547	3,767	8,090	1,747	2,273

- continued -



## Appendix B.14 (2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
7/23	2,328	1,231	3,979	4,748	5,005	2,564	2,520	983	2,975	2,512	4,585	3,810	8,109	1,761	2,277
7/24	2,331	1,233	4,008	4,776	5,030	2,564	2,544	995	2,981	2,521	4,641	3,837	8,151	1,805	2,281
7/25	2,339	1,243	4,019	4,817	5,045	2,568	2,552	1,051	2,991	2,521	4,666	3,853	8,176	1,839	2,286
7/26	2,346	1,249	4,021	4,837	5,058	2,568	2,554	1,059	2,999	2,523	4,675	3,879	8,200	1,858	2,293
7/27	2,353	1,251	4,023	4,841	5,075	2,568	2,572	1,108	3,006	2,530	4,684	3,897	8,219	1,864	2,299
7/28	2,356	1,255	4,031	4,847	5,085	2,568	2,607	1,126	3,015	2,534	4,702	3,920	8,224	1,870	2,299
7/29	2,364	1,265	4,042	4,852	5,098	2,570	2,643	1,162	3,019	2,539	4,712	3,929	8,232	1,886	2,301
7/30	2,370	1,269	4,047	4,854	5,120	2,570	2,651	1,175	3,025	2,541	4,719	3,931	8,243	1,888	2,313
7/31	2,370	1,270	4,047	4,856	5,126	2,584	2,653	1,199	3,025	2,547	4,732	3,942	8,244	1,890	2,313
8/01	2,372	1,270	4,051	4,860	5,131	2,590	2,659	1,207	3,025	2,552	4,748	3,950	8,248	1,898	2,313
8/02	2,375	1,271	4,051	4,863	5,135	2,598	2,665	1,213	3,040	2,558	4,759	3,952	8,253	1,907	2,313
8/03	2,378	1,272	4,055	4,872	5,142	2,602	2,671	1,224	3,042	2,561	4,761	3,964	8,253	1,925	2,317
8/04	2,383	1,281	4,055	4,884	5,145	2,603	2,672	1,234	3,042	2,571	4,763	3,970	8,253	1,939	2,322
8/05	2,385	1,281	4,055	4,887	5,148	2,603	2,673	1,234	3,042	2,581	4,765	3,972	8,253	1,939	2,322
8/06	2,385	1,285	4,058	4,891	5,155	2,606	2,697	1,236	3,046	2,583	4,765	3,977	8,253	1,939	2,322
8/07	2,385	1,290	4,059	4,891	5,174	2,608	2,703	1,238	3,046	2,583	4,769	3,981	8,253	1,941	2,322
8/08	2,385	1,290	4,059	4,891	5,177	2,608	2,703	1,243	3,046	2,583	4,778	3,981	8,253	1,943	2,324
8/09	2,385	1,290	4,062	4,893	5,180	2,610	2,707	1,245	3,050	2,583	4,785	3,981	8,253	1,947	2,324
8/10	2,385	1,326	4,062	4,895	5,184	2,610	2,708	1,248	3,050	2,583	4,787	3,981	8,255	1,949	2,326
8/11	2,385	1,327	4,062	4,895	5,187	2,610	2,710	1,252	3,052	2,583	4,791	3,983	8,255	1,953	2,326
8/12	2,385	1,327	4,062	4,895	5,189	2,610	2,714	1,255	3,058	2,583	4,793	3,983	8,255	1,953	2,326
8/13	2,385	1,327	4,062	4,895	5,189	2,610	2,714	1,257	3,058	2,583	4,793	3,983	8,255	1,953	2,330
8/14	2,385	1,327	4,063	4,895	5,189	2,610	2,714	1,257	3,058	2,583	4,793	3,985	8,255	1,953	2,330
8/15	2,385	1,327	4,066	4,899	5,189	2,610	2,716	1,258	3,058	2,583	4,793	3,985	8,255	1,953	2,330
8/16	2,385	1,327	4,066	4,900	5,189	2,610	2,718	1,258	3,058	2,583	4,795	3,985	8,255	1,953	2,330
8/17	2,385	1,327	4,066	4,900	5,189	2,610	2,718	1,260	3,058	2,583	4,795	3,985	8,255	1,953	2,330
8/18	2,387	1,327	4,066	4,900	5,189	2,610	2,718	1,262	3,058	2,583	4,797	3,985	8,255	1,953	2,330
8/19	2,387	1,327	4,066	4,900	5,189	2,610	2,718	1,262	3,058	2,585	4,797	3,985	8,255	1,953	2,330
8/20	2,387	1,327	4,066	4,900	5,189	2,610	2,718	1,262	3,058	2,585	4,797	3,985	8,255	1,955	2,332
8/21	2,387	1,327	4,066	4,900	5,189	2,610	2,718	1,262	3,058	2,585	4,797	3,985	8,255	1,957	2,332
8/22	2,387	1,327	4,066	4,900	5,189	2,610	2,720	1,262	3,058	2,585	4,797	3,987	8,255	1,957	2,332
8/23	2,387	1,327	4,066	4,900	5,189	2,610	2,720	1,262	3,058	2,585	4,797	3,987	8,255	1,959	2,332
8/24	2,387	1,327	4,066	4,900	5,189	2,610	2,720	1,262	3,058	2,585	4,797	3,987	8,255	1,959	2,332
8/25	2,387	1,327	4,066	4,900	5,189	2,610	2,720	1,262	3,058	2,585	4,797	3,987	8,255	1,959	2,332
8/26	2,387	1,327	4,066	4,900	5,189	2,610	2,720	1,262	3,058	2,585	4,797	3,987	8,255	1,959	2,332
8/27	2,387	1,327	4,066	4,900	5,189	2,610	2,722	1,262	3,058	2,585	4,797	3,987	8,255	1,959	2,332
8/28	2,387	1,327	4,066	4,900	5,189	2,610	2,722	1,262	3,058	2,585	4,797	3,987	8,255	1,959	
8/29	2,387	1,327		4,900	5,189	2,610	2,722	1,262	3,058	2,587	4,797	3,987			
8/30	2,387	1,327		4,900		2,610	2,722	1,262	3,058	2,587	4,797				
8/31	2,387			4,900		2,610	2,722	1,262	3,058	2,587					
9/01	2,387			4,900											
9/02	2,387			4,900											
9/03	2,387			4,900											
9/04	2,387			4,900											
9/05	2,387			4,900											
9/06	2,387			4,900											
9/07				2,762											
9/08				2,762											
9/09				2,762											
9/10				2,762											
9/11				2,762											

<sup>a</sup> Boxed values indicate days when there was a commercial fishing period in District W1.

Appendix B.15 Historic cumulative daily percent passage for chum salmon catches in the Bethel test fishery, 1984 - 1998.<sup>a</sup>

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Median
6/01	0	0				0	0		0	0	0	0	0			0
6/02	0	0			0	0	0	0	0	0	0	0	0	0	0	0
6/03	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
6/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/06	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
6/07	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
6/08	0	0	1	1	0	1	0	0	0	0	1	0	1	0	0	0
6/09	1	0	1	1	1	1	0	0	1	0	1	0	1	0	0	1
6/10	1	0	1	1	2	2	0	0	1	0	1	0	2	0	0	1
6/11	1	0	2	1	3	2	0	0	1	1	1	0	3	0	0	1
6/12	2	0	2	2	5	2	0	0	1	1	1	0	4	0	0	1
6/13	2	0	2	2	6	3	0	0	3	1	2	0	6	0	1	2
6/14	3	0	2	2	7	3	1	1	4	1	3	0	10	0	1	2
6/15	3	0	3	2	8	5	1	1	7	2	6	1	12	1	1	3
6/16	4	1	4	3	8	6	1	1	11	2	7	2	14	2	1	4
6/17	6	1	7	6	9	6	2	1	13	2	8	4	16	2	2	6
6/18	9	2	10	7	13	8	2	1	14	4	9	5	18	4	2	7
6/19	9	7	14	7	16	10	3	1	14	4	14	6	26	5	2	8
6/20	10	15	15	8	17	12	4	3	15	4	15	8	35	6	2	11
6/21	12	16	17	8	20	15	5	3	17	6	20	12	45	12	2	14
6/22	13	17	20	13	25	17	6	4	19	9	23	14	49	15	3	16
6/23	17	20	25	15	29	20	8	5	20	12	27	17	55	16	12	18
6/24	24	20	28	16	31	27	10	5	21	17	29	18	63	18	19	21
6/25	31	24	39	17	31	34	12	6	23	21	30	24	69	21	20	24
6/26	35	29	43	19	33	39	13	8	24	21	30	28	73	27	21	28
6/27	39	33	46	21	38	44	20	13	31	21	30	28	74	29	26	31
6/28	44	35	47	23	40	47	22	17	34	22	30	30	75	29	31	32
6/29	45	48	47	28	43	52	25	22	39	23	33	33	76	33	43	41
6/30	47	62	49	33	44	56	27	23	43	29	33	36	77	34	47	44
7/01	52	68	50	36	52	60	29	25	47	33	33	40	78	37	51	48
7/02	59	70	51	39	55	63	30	32	48	34	33	44	80	38	60	50
7/03	61	72	56	40	64	66	37	34	57	39	37	51	80	41	65	57
7/04	70	72	59	41	73	68	45	36	68	42	40	56	82	42	68	63
7/05	77	75	67	44	76	75	52	37	74	45	42	61	84	46	70	68
7/06	79	77	70	52	79	77	53	38	77	47	50	62	85	48	73	71
7/07	82	84	72	62	79	81	59	39	78	48	55	69	86	54	79	75
7/08	84	84	73	63	80	84	64	40	82	50	71	76	86	60	89	78
7/09	86	85	79	68	82	86	67	44	84	52	79	81	86	64	92	82
7/10	87	85	80	72	85	89	70	48	85	53	84	82	88	65	94	84
7/11	88	85	82	74	86	89	73	50	87	54	85	85	88	68	94	85
7/12	88	85	86	75	87	89	75	53	89	57	86	86	89	70	94	86
7/13	89	86	90	77	89	91	76	55	91	67	88	88	90	73	95	89
7/14	89	86	90	82	89	92	77	57	92	70	90	89	90	74	95	89
7/15	93	86	90	83	91	93	78	59	93	75	90	90	92	77	95	90

- continued -

## Appendix B.15 (2 of 2)

Date	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Mec.
7/16	94	86	91	84	92	94	80	60	94	78	91	90	93	79	95	91
7/17	95	88	92	86	94	94	80	61	95	81	91	91	94	80	95	92
7/18	95	89	93	88	95	95	83	65	95	83	92	91	95	83	95	93
7/19	96	91	94	93	95	96	85	66	96	87	93	92	96	85	95	94
7/20	96	91	95	96	95	97	88	68	96	89	93	93	96	87	96	95
7/21	97	91	96	97	96	97	90	71	97	91	93	93	97	88	97	96
7/22	97	92	97	97	96	98	91	75	97	96	95	94	98	89	97	96
7/23	98	93	98	97	96	98	93	78	97	97	96	96	98	90	97	97
7/24	98	93	99	97	97	98	93	79	97	98	97	96	99	92	97	97
7/25	98	94	99	98	97	98	94	83	98	98	97	97	99	94	98	98
7/26	98	94	99	99	97	98	94	84	98	98	97	97	99	95	98	98
7/27	99	94	99	99	98	98	94	88	98	98	98	98	100	95	98	98
7/28	99	95	99	99	98	98	96	89	99	98	98	98	100	95	98	98
7/29	99	95	99	99	98	98	97	92	99	98	98	99	100	96	99	98
7/30	99	96	100	99	99	98	97	93	99	98	98	99	100	96	99	99
7/31	99	96	100	99	99	99	97	95	99	99	99	99	100	96	99	99
8/01	99	96	100	99	99	99	98	96	99	99	99	99	100	97	99	99
8/02	100	96	100	99	99	100	98	96	99	99	99	99	100	97	99	99
8/03	100	96	100	99	99	100	98	97	99	99	99	99	100	98	99	99
8/04	100	96	100	100	99	100	98	98	99	99	99	100	100	99	100	99
8/05	100	96	100	100	99	100	98	98	99	100	99	100	100	99	100	100
8/06	100	97	100	100	99	100	99	98	100	100	99	100	100	99	100	1
8/07	100	97	100	100	100	100	99	98	100	100	99	100	100	99	100	1
8/08	100	97	100	100	100	100	99	98	100	100	100	100	100	99	100	100
8/09	100	97	100	100	100	100	99	99	100	100	100	100	100	99	100	100
8/10	100	100	100	100	100	100	100	99	100	100	100	100	100	99	100	100
8/11	100	100	100	100	100	100	100	99	100	100	100	100	100	100	100	100
8/12	100	100	100	100	100	100	100	99	100	100	100	100	100	100	100	100
8/13	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/17	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/18	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/19	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/21	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/22	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/23	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/24	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/26	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/27	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
8/28	100	100	100	100	100	100	100	100	100	100	100	100	100	100		100

<sup>a</sup> The boxed areas within each column represent the central 50 percent test-fish catches and the median.



Appendix B.16. Historical commercial salmon harvest in the Kuskokwim River, Districts 1 and 2 combined, 1960 - 1998 <sup>a</sup>.

Year	Chinook	Sockeye	Chum	Pink	Coho	Total
1960	5,969	0	0	0	2,498	8,467
1961	18,918	0	0	0	5,044	23,962
1962	15,341	0	0	0	12,432	27,773
1963	12,016	0	0	0	15,660	27,676
1964	17,149	0	0	0	28,613	45,762
1965	21,989	0	0	0	12,191	34,180
1966	25,545	0	0	0	22,985	48,530
1967	29,986	0	148	0	56,313	86,447
1968	34,278	0	187	0	127,306	161,771
1969	43,997	322	7,165	0	83,765	135,249
1970	39,290	117	1,664	44	38,601	79,716
1971	40,274	2,606	68,914	0	5,253	117,047
1972	39,454	102	78,619	8	22,579	140,762
1973	32,838	369	148,746	33	130,876	312,862
1974	18,664	136	171,887	84	147,269	338,040
1975	21,720	23	181,840	10	81,945	285,538
1976	30,735	2,971	177,864	133	88,501	300,204
1977	35,830	9,379	248,721	203	241,364	535,497
1978	45,641	733	248,656	5,832	213,393	514,255
1979	38,966	1,054	261,874	78	219,060	521,032
1980	35,881	360	483,211	803	222,012	742,267
1981	47,663	48,375	418,677	292	211,251	726,258
1982	48,234	33,154	278,306	1,748	447,117	808,559
1983	33,174	68,855	267,698	211	196,287	566,225
1984	31,742	48,575	423,718	2,942	623,447	1,130,424
1985	37,889	106,647	199,478	75	335,606	679,695
1986	19,414	95,433	309,213	3,422	659,988	1,087,470
1987	36,179	136,602	574,336	43	399,467	1,146,627
1988	55,716	92,025	1,381,674	10,825	524,296	2,064,536
1989	43,217	42,747	749,182	464	479,856	1,315,466
1990	53,504	84,870	461,624	3,397	410,332	1,013,727
1991	37,778	108,946	431,802	378	500,935	1,079,839
1992	46,872	92,218	344,603	7,451	666,170	1,157,314
1993	8,735	27,008	43,337	64	610,739	689,883
1994	16,211	49,365	271,115	30,949	724,689	1,092,329
1995	30,846	92,500	605,918	93	471,461	1,200,818
1996	7,421	33,878	207,877	1,621	937,299	1,188,096
1997	10,441	21,989	17,026	2	130,803	180,261
1998	17,359	60,906	207,809	92	210,481	496,647
10-Year Average (1988-1997)	31,074	64,555	451,416	10,849 <sup>b</sup>	546,658	1,104,522

<sup>a</sup> Includes harvests in District 3 from 1960 to 1965.

<sup>b</sup> Even years only

Appendix B17. Utilization of chum salmon in the Kuskokwim River, 1960-1998.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test Fishery Harvest	Total Utilization	Running 10-Year Average
1960	0	301,753 <sup>c</sup>		301,753	
1961	0	179,529 <sup>c</sup>		179,529	
1962	0	161,849 <sup>c</sup>		161,849	
1963	0	137,649 <sup>c</sup>		137,649	
1964	0	190,191 <sup>c</sup>		190,191	
1965	0	250,878 <sup>c</sup>		250,878	
1966	0	175,735 <sup>c</sup>	502 <sup>d</sup>	176,237	
1967	148	208,445 <sup>c</sup>	338	208,931	
1968	187	275,008 <sup>c</sup>	562	275,757	
1969	7,165	204,105 <sup>c</sup>	384	211,654	209,443
1970	1,664	246,810 <sup>c</sup>	1,139 <sup>d</sup>	249,613	204,229
1971	68,914	116,391 <sup>c</sup>	254	185,559	204,832
1972	78,619	120,316 <sup>c</sup>	486	199,421	208,589
1973	148,746	179,259 <sup>c</sup>	675	328,680	227,692
1974	171,887	277,170 <sup>c</sup>	2,021	451,078	253,781
1975	184,171	176,389 <sup>c</sup>	1,062	361,622	264,855
1976	177,864	223,792 <sup>c</sup>	2,101	403,757	287,607
1977	248,721	198,355 <sup>c</sup>	576	447,652	311,479
1978	248,656	118,809 <sup>c</sup>	2,153	369,618	320,865
1979	261,874	161,239 <sup>c</sup>	412	423,525	342,053
1980	483,751	165,172 <sup>c</sup>	2,058	650,981	382,189
1981	418,677	157,306 <sup>c</sup>	1,793	577,776	421,411
1982	278,306	190,011 <sup>c</sup>	504	468,821	448,351
1983	276,698	146,876 <sup>c</sup>	1,069	424,643	457,947
1984	423,718	142,542 <sup>c</sup>	1,186	567,446	469,584
1985	199,478	94,750	616	294,844	462,906
1986	309,213	141,931 <sup>c</sup>	1,693	452,837	467,814
1987	574,336	70,709	2,302	647,347	487,784
1988	1,381,674	151,967 <sup>c</sup>	4,379	1,538,020	604,624
1989	748,338	140,345	2,082	890,765	651,348
1990	460,112	125,626	2,107	587,845	645,034
1991	431,802	92,961	931	525,694	639,826
1992	344,603	96,081	15,330	456,014	638,546
1993	43,337	59,259	8,451	111,047	607,186
1994	271,115	72,268	11,998	355,381	585,979
1995	605,918	68,263	17,473	691,654	625,660
1996	207,877	89,430	2,864	300,171	610,394
1997	17,026	29,076	790	46,892	550,348
1998	267,059	67,665	1,140	335,864	430,133
10-Yr. Ave.					
(1988-1997)	451,180	92,528	6,641	550,348	

<sup>a</sup> Districts 1 and 2 only; no chum harvests were reported in District 3.<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.<sup>c</sup> Includes small numbers of small chinook, sockeye and coho salmon.<sup>d</sup> Includes small numbers of sockeye.<sup>e</sup> Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Appendix B.18. Historical commercial salmon catches by fishing period in Kuskokwim Area District 1, 1974-1998.

Year	Date	Number of		Hours	Permit	Chinook		Sockeye		Chum		Coho	
		Permits	Fished			Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1974	Jun 10 - 11 <sup>a</sup>	422	12	5,064	4,384	0.9		1	0.0	153	0.0	0	0.0
	Jun 13 - 14 <sup>a</sup>	488	12	5,856	5,790	1.0		2	0.0	607	0.1	0	0.0
	Jun 17 - 18 <sup>a</sup>	506	12	6,072	5,857	1.0		62	0.0	1,394	0.2	0	0.0
	Jun 27 <sup>b</sup>	267	6	1,602	558	0.3		0	0.0	27,017	16.9	0	0.0
	Jul 01 - 02 <sup>b</sup>	380	12	4,560	561	0.1		26	0.0	55,356	12.1	0	0.0
	Jul 04 - 05 <sup>b</sup>	282	12	3,384	196	0.1		0	0.0	27,211	8.0	0	0.0
	Jul 08 - 09 <sup>b</sup>	376	12	4,512	286	0.1		1	0.0	50,672	11.2	0	0.0
	Jul 18 <sup>b</sup>	190	6	1,140	31	0.0		0	0.0	6,661	5.8	19	0.0
	Aug 01 - 02 <sup>b</sup>	267	12	3,204	17	0.0		9	0.0	813	0.3	9,576	3.0
	Aug 05 - 08 <sup>b</sup>	444	72	31,968	18	0.0		35	0.0	1,170	0.0	59,090	1.8
	Aug 12 - 15 <sup>b</sup>	396	72	28,512	12	0.0		0	0.0	103	0.0	58,066	2.0
	Aug 19 - 22 <sup>b</sup>	263	72	18,936	0	0.0		0	0.0	32	0.0	12,301	0.6
	Aug 26 - 29 <sup>b</sup>	107	72	7,704	1	0.0		0	0.0	10	0.0	5,360	0.7
	Sept. 02 - 05 <sup>b</sup>	25	72	1,800	0	0.0		0	0.0	0	0.0	430	0.2
Total		666	456	124,314	17,711			136		171,199		144,842	
1975	Jun 16 <sup>a</sup>	12	6	72	359	4.99		0	0.0	3	0.0	0	0.0
	Jun 19 - 20 <sup>a</sup>	46	12	552	1,031	1.87		0	0.0	34	0.1	0	0.0
	Jun 23 - 24 <sup>a</sup>	483	12	5,796	17,235	2.97		0	0.0	3,792	0.7	0	0.0
	Jun 30 <sup>b</sup>	276	6	1,656	691	0.42		0	0.0	31,216	18.9	0	0.0
	Jul 03 <sup>b</sup>	360	6	2,160	636	0.29		0	0.0	35,525	16.4	0	0.0
	Jul 07 <sup>b</sup>	369	6	2,214	421	0.19		0	0.0	39,396	17.8	0	0.0
	Jul 10 <sup>b</sup>	304	6	1,824	195	0.11		0	0.0	39,910	21.9	0	0.0
	Jul 14 <sup>b</sup>	326	6	1,956	179	0.09		0	0.0	21,092	10.8	0	0.0
	Aug 01 <sup>b</sup>	142	6	852	5	0.01		0	0.0	2,113	2.5	2,357	2.8
	Aug 04 - 06 <sup>b</sup>	292	48	14,016	40	0.00		1	0.0	5,639	0.4	12,500	0.9
	Aug 11 - 13 <sup>b</sup>	373	48	17,904	8	0.00		0	0.0	2,247	0.1	18,551	1.0
	Aug 18 - 20 <sup>b</sup>	388	48	18,624	16	0.00		3	0.0	746	0.0	34,435	1.8
	Aug 25 - 27 <sup>b</sup>	270	48	12,960	0	0.00		0	0.0	73	0.0	16,277	1.3
Total		737	258	80,586	20,816			4		181,786		84,120	
1976	Jun 17 <sup>a</sup>	459	6	2,754	6,962	2.5		1	0.0	532	0.2	0	0.00
	Jun 21 <sup>a</sup>	495	6	2,970	13,048	4.4		0	0.0	2,543	0.9	0	0.00
	Jun 28 <sup>b</sup>	348	6	2,088	4,143	2.0		508	0.2	42,464	20.3	0	0.00
	Jul 01 <sup>b</sup>	415	6	2,490	1,550	0.6		338	0.1	44,024	17.7	0	0.00
	Jul 08 <sup>b</sup>	381	6	2,286	894	0.4		1,268	0.6	48,669	21.3	0	0.00
	Jul 12 <sup>b</sup>	344	6	2,262	344	0.2		701	0.3	21,153	9.4	0	0.00
	Jul 15 <sup>b</sup>	265	6	1,590	236	0.1		151	0.1	14,176	8.9	44	0.03
	Aug 02 - 03 <sup>b</sup>	286	24	6,864	83	0.0		0	0.0	2,067	0.3	10,534	1.53
	Aug 09 - 11 <sup>b</sup>	400	48	19,200	96	0.0		3	0.0	866	0.0	29,728	1.55
	Aug 16 - 18 <sup>b</sup>	387	48	18,576	50	0.0		1	0.0	154	0.0	28,664	1.54
	Aug 23 - 25 <sup>b</sup>	300	48	14,400	10	0.0		0	0.0	69	0.0	14,543	1.01
	Aug 30 - 31 <sup>b</sup>	174	42	7,308	2	0.0		0	0.00	10	0.0	4,420	0.60
Total		674	252	82,788	27,418			2,971		176,727		87,933	
1977	Jun 15 <sup>a</sup>	467	6	2,802	12,458	4.45		20	0.0	334	0.12	0	0.00
	Jun 20 <sup>a</sup>	484	6	2,904	16,227	5.59		18	0.0	1,715	0.59	0	0.00
	Jun 27 <sup>b</sup>	378	6	2,268	1,337	0.59		1,386	0.6	40,321	17.78	0	0.00
	Jun 30 <sup>b</sup>	409	6	2,454	504	0.21		3,655	1.5	58,884	24.00	0	0.00
	Jul 04 <sup>b</sup>	331	6	1,986	266	0.13		1,952	1.0	37,500	18.88	0	0.00
	Jul 07 <sup>b</sup>	368	6	2,208	407	0.18		1,799	0.8	56,943	25.79	0	0.00
	Jul 14 <sup>b</sup>	385	6	2,310	153	0.07		77	0.0	24,765	10.72	1	0.00
	Aug 01 - 02 <sup>b</sup>	360	24	8,640	91	0.01		392	0.0	7,157	0.83	23,987	2.78
	Aug 08 <sup>b</sup>	487	48	23,376	117	0.01		59	0.0	3,306	0.14	91,474	3.91
	Aug 15 - 16 <sup>b</sup>	438	24	10,512	57	0.01		4	0.0	1,161	0.11	60,935	5.80
	Aug 18 <sup>b</sup>	378	12	4,536	13	0.00		1	0.0	224	0.05	25,589	5.64
	Aug 22 <sup>b</sup>	361	12	4,332	12	0.00		6	0.0	202	0.05	16,980	3.92
	Aug 25 <sup>b</sup>	264	12	3,168	12	0.00		0	0.0	127	0.04	11,874	3.75
	Aug 29 <sup>b</sup>	204	12	2,448	5	0.00		0	0.0	42	0.02	6,819	2.79
Total		653	186	73,944	31,659			9,369		232,681		237,659	

-continued-

Year	Date	Number of		Permit	Chinook		Sockeye		Chum		Coho	
		Permits	Hours	Hours	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1978	Jun 09 <sup>a</sup>	509	6	3,054	7,590	2.49	10	0.0	734	0.24	0	0.00
	Jun 14 <sup>a</sup>	266	6	1,596	6,142	3.85	0	0.0	1,291	0.81	0	0.00
	Jun 16 <sup>a</sup>	396	6	2,376	12,341	5.19	22	0.0	5,950	2.50	0	0.00
	Jun 22 <sup>a</sup>	72	4	288	1,724	5.99	0	0.0	1,629	5.66	0	0.00
	Jun 23 <sup>a</sup>	429	4	1,716	8,342	4.86	0	0.0	12,587	7.34	0	0.00
	Jun 26 <sup>b</sup>	499	5	2,694	1,964	0.73	1	0.0	44,296	16.44	0	0.00
	Jun 29 <sup>b</sup>	422	6	2,652	1,759	0.66	52	0.0	36,793	13.87	0	0.00
	Jul 03 <sup>b</sup>	476	6	2,856	894	0.31	93	0.0	26,629	9.32	0	0.00
	Jul 06 <sup>b</sup>	485	12	5,820	1,460	0.25	302	0.1	48,031	8.25	0	0.00
	Jul 10 <sup>b</sup>	428	12	5,136	694	0.14	216	0.0	48,931	9.53	0	0.00
	Jul 13 <sup>b</sup>	422	6	2,532	293	0.12	0	0.0	14,935	5.90	0	0.00
	Aug 01 <sup>b</sup>	297	12	3,564	97	0.03	23	0.0	3,298	0.93	6,311	1.77
	Aug 04 <sup>b</sup>	364	12	4,368	79	0.02	6	0.0	906	0.21	9,445	2.16
	Aug 08 <sup>b</sup>	433	12	5,196	65	0.01	4	0.0	629	0.12	28,501	5.49
	Aug 11 <sup>b</sup>	485	12	5,820	39	0.01	2	0.0	280	0.05	42,428	7.29
	Aug 15 <sup>b</sup>	476	12	5,712	33	0.01	0	0.0	87	0.02	48,950	8.57
	Aug 18 <sup>b</sup>	434	12	5,208	16	0.00	2	0.0	67	0.01	29,485	5.66
	Aug 22 <sup>b</sup>	396	12	4,752	8	0.00	0	0.0	53	0.01	22,287	4.69
	Aug 25 <sup>b</sup>	293	12	3,516	12	0.00	0	0.0	13	0.00	11,168	3.18
	Aug 29 <sup>b</sup>	250	12	3,000	1	0.00	0	0.0	80	0.03	12,215	4.07
Total		723	182	71,856	43,553		733		247,219		210,790	
1979	Jun 11 <sup>a</sup>	523	6	3,138	12,270	3.91	14	0.00	462	0.15	0	0.00
	Jun 15 <sup>a</sup>	549	6	3,294	12,363	3.75	37	0.01	2,055	0.62	0	0.00
	Jun 22 <sup>b</sup>	502	6	3,012	5,651	1.88	50	0.02	32,295	10.72	0	0.00
	Jun 26 <sup>b</sup>	531	6	3,186	2,277	0.71	23	0.01	53,648	16.84	0	0.00
	Jun 29 <sup>b</sup>	542	6	3,252	1,583	0.49	8	0.00	48,643	14.96	0	0.00
	Jul 03 <sup>b</sup>	542	6	3,252	1,233	0.38	21	0.01	83,164	25.57	0	0.00
	Jul 10 <sup>b</sup>	520	6	3,120	470	0.15	23	0.01	32,434	10.40	0	0.00
	Aug 02 <sup>b</sup>	478	12	5,736	67	0.01	186	0.03	3,643	0.64	52,276	9.11
	Aug 06 <sup>b</sup>	480	6	2,880	38	0.01	54	0.02	1,148	0.40	53,797	18.68
	Aug 09 <sup>b</sup>	497	6	2,982	34	0.01	19	0.01	502	0.17	26,422	8.86
	Aug 13 <sup>b</sup>	463	6	2,778	20	0.01	11	0.00	179	0.06	27,915	10.05
	Aug 16 <sup>b</sup>	467	6	2,802	16	0.01	4	0.00	129	0.05	21,675	7.74
	Aug 20 <sup>b</sup>	390	6	2,340	23	0.01	7	0.00	104	0.04	19,445	8.31
	Aug 23 <sup>b</sup>	328	6	1,968	0	0.00	0	0.00	54	0.03	5,376	2.73
	Aug 27 <sup>b</sup>	310	12	3,720	6	0.00	2	0.00	40	0.01	6,342	1.70
	Aug 30 <sup>b</sup>	179	12	2,148	2	0.00	1	0.00	16	0.01	2,182	1.02
Total		685	114	49,608	36,053		460		258,516		215,430	
1980	Jun 12 <sup>a</sup>	469	6	2,814	9,891	3.51	2	0.00	711	0.25	0	0.00
	Jun 18 <sup>a</sup>	468	6	2,808	16,921	6.03	24	0.01	5,940	2.12	0	0.00
	Jun 23 <sup>b</sup>	426	6	2,616	4,777	1.83	0	0.00	105,825	40.45	0	0.00
	Jun 26 <sup>b</sup>	408	6	2,448	1,460	0.60	0	0.00	131,945	53.90	0	0.00
	Jul 02 <sup>b</sup>	383	6	2,298	498	0.22	23	0.01	122,613	53.36	0	0.00
	Jul 09 <sup>b</sup>	431	6	2,586	445	0.17	4	0.00	90,233	34.89	0	0.00
	Aug 04 <sup>b</sup>	375	6	2,250	54	0.02	73	0.03	2,697	1.20	9,889	4.40
	Aug 07 <sup>b</sup>	455	6	2,730	45	0.02	67	0.02	2,098	0.77	36,126	13.23
	Aug 11 <sup>b</sup>	482	6	2,892	33	0.01	64	0.02	4,350	1.50	35,178	12.16
	Aug 14 <sup>b</sup>	439	6	2,634	23	0.01	38	0.01	366	0.14	28,211	10.71
	Aug 18 <sup>b</sup>	441	6	2,646	12	0.00	25	0.01	179	0.07	43,748	16.53
	Aug 21 <sup>b</sup>	419	6	2,514	10	0.00	26	0.01	94	0.04	33,274	13.24
	Aug 25 <sup>b</sup>	370	6	2,220	12	0.01	9	0.00	64	0.03	19,264	8.68
	Aug 28 <sup>b</sup>	319	6	1,914	3	0.00	5	0.00	19	0.01	13,484	7.04
Total		663	84	35,370	34,184		360		467,134		219,174	

-continued-

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1981	Jun 10 <sup>a</sup>	489	6	2,934	11,897	4.05	48	0.0	2,623	0.89	0	0.00
	Jun 16 <sup>a</sup>	541	6	3,246	17,985	5.54	316	0.1	11,501	3.54	0	0.00
	Jun 22 <sup>b</sup>	511	6	3,066	3,830	1.25	3,852	1.3	78,168	25.50	0	0.00
	Jun 25 <sup>b</sup>	508	6	3,048	2,000	0.66	6,037	2.0	81,431	26.72	0	0.00
	Jun 30 <sup>b</sup>	484	6	2,904	2,563	0.88	12,262	4.2	51,942	17.89	0	0.00
	Jul 02 <sup>b</sup>	459	6	2,754	1,707	0.62	9,769	3.5	58,594	21.28	0	0.00
	Jul 06 <sup>b</sup>	461	6	2,766	1,088	0.39	5,510	2.0	55,799	20.17	0	0.00
	Jul 09 <sup>b</sup>	440	6	2,640	941	0.36	7,760	2.9	66,138	25.05	0	0.00
	Aug 03 <sup>b</sup>	430	6	2,580	101	0.04	1,057	0.4	1,866	0.72	16,184	6.27
	Aug 06 <sup>b</sup>	441	6	2,646	77	0.03	674	0.3	1,046	0.40	13,885	5.25
	Aug 10 <sup>b</sup>	445	6	2,670	54	0.02	454	0.2	629	0.24	26,972	10.10
	Aug 13 <sup>b</sup>	473	6	2,838	54	0.02	233	0.1	448	0.16	46,252	16.30
	Aug 17 <sup>b</sup>	458	6	2,748	38	0.01	146	0.1	164	0.06	34,739	12.64
	Aug 20 <sup>b</sup>	380	6	2,280	17	0.01	55	0.0	73	0.03	24,184	10.61
	Aug 24 <sup>b</sup>	372	6	2,232	16	0.01	28	0.0	40	0.02	23,771	10.65
	Aug 27 <sup>b</sup>	346	6	2,076	16	0.01	25	0.0	59	0.03	13,785	6.64
	Aug 31 <sup>b</sup>	278	6	1,668	8	0.00	20	0.0	21	0.01	8,086	4.85
Total		679	102	45,096	42,011		45,554		410,542		207,858	
1982	Jun 14 <sup>a</sup>	464	6	2,784	4,912	1.76	321	0.12	2,532	0.91	0	0.00
	Jun 17 <sup>a</sup>	496	6	2,892	11,285	3.90	1,061	0.37	4,694	1.62	0	0.00
	Jun 21 <sup>a</sup>	499	6	2,994	13,343	4.46	2,432	0.81	10,003	3.34	0	0.00
	Jun 24 <sup>a</sup>	459	4	1,836	8,548	4.66	3,157	1.72	12,908	7.03	0	0.00
	Jun 28 <sup>b</sup>	352	4	1,408	1,943	1.38	9,938	7.06	58,528	41.57	0	0.00
	Jun 30 <sup>b</sup>	483	4	1,932	2,064	1.07	5,824	3.01	47,773	24.73	0	0.00
	Jul 02 <sup>b</sup>	434	4	1,736	1,095	0.63	3,110	1.79	38,918	22.42	0	0.00
	Jul 05 <sup>b</sup>	372	6	2,232	875	0.39	2,769	1.24	29,315	13.13	0	0.00
	Jul 08 <sup>b</sup>	435	6	2,610	748	0.29	1,786	0.68	28,942	11.09	2	0.00
	Jul 12 <sup>b</sup>	354	6	2,124	307	0.14	638	0.30	20,709	9.75	23	0.01
	Jul 29 <sup>b</sup>	416	6	2,496	114	0.05	48	0.02	2,599	1.04	19,561	7.84
	Aug 02 <sup>b</sup>	388	6	2,328	67	0.03	69	0.03	949	0.41	31,944	13.72
	Aug 05 <sup>b</sup>	445	6	2,670	47	0.02	26	0.01	624	0.23	35,766	13.40
	Aug 09 <sup>b</sup>	442	6	2,652	29	0.01	25	0.01	342	0.13	61,231	23.09
	Aug 12 <sup>b</sup>	449	6	2,694	26	0.01	6	0.00	189	0.07	80,685	29.95
	Aug 16 <sup>b</sup>	420	6	2,520	15	0.01	5	0.00	96	0.04	77,785	30.87
	Aug 19 <sup>b</sup>	403	6	2,418	12	0.00	12	0.00	69	0.03	49,566	20.50
	Aug 23 <sup>b</sup>	349	6	2,094	3	0.00	5	0.00	28	0.01	25,218	12.04
	Aug 26 <sup>b</sup>	314	6	1,884	9	0.00	0	0.00	18	0.01	26,761	14.20
	Aug 30 <sup>b</sup>	302	6	1,812	7	0.00	1	0.00	18	0.01	26,815	14.80
Total		686	112	46,116	45,120		31,233		259,254		435,357	
1983	Jun 13 <sup>a</sup>	489	6	2,934	7,445	2.54	114	0.04	829	0.28	0	0.00
	Jun 16 <sup>a</sup>	450	6	2,700	5,961	2.21	156	0.06	976	0.36	0	0.00
	Jun 20 <sup>b</sup>	474	6	2,844	4,776	1.68	3,289	1.16	28,915	10.17	0	0.00
	Jun 23 <sup>b</sup>	450	6	2,700	3,287	1.22	4,807	1.78	24,625	9.12	0	0.00
	Jun 27 <sup>b</sup>	446	6	2,676	2,566	0.96	10,465	3.91	44,802	16.74	0	0.00
	Jun 30 <sup>b</sup>	547	6	3,282	2,359	0.72	12,490	3.81	55,209	16.82	0	0.00
	Jul 04 <sup>b</sup>	443	6	2,658	1,213	0.46	24,540	9.23	46,176	17.37	0	0.00
	Jul 07 <sup>b</sup>	496	6	2,976	1,202	0.40	7,286	2.45	36,965	12.42	0	0.00
	Jul 11 <sup>b</sup>	466	6	2,796	633	0.23	3,001	1.07	20,560	7.35	0	0.00
	Aug 01 <sup>b</sup>	377	6	2,262	238	0.11	478	0.21	4,041	1.79	9,767	4.32
	Aug 04 <sup>b</sup>	430	6	2,580	237	0.09	272	0.11	2,580	1.00	15,389	5.96
	Aug 08 <sup>b</sup>	383	6	2,298	130	0.06	444	0.19	1,322	0.58	34,541	15.03
	Aug 11 <sup>b</sup>	485	6	2,910	96	0.03	146	0.05	534	0.18	35,268	12.12
	Aug 15 <sup>b</sup>	462	6	2,772	64	0.02	71	0.03	148	0.05	24,072	8.68
	Aug 18 <sup>b</sup>	408	6	2,448	56	0.02	52	0.02	111	0.05	22,822	9.32
	Aug 22 <sup>b</sup>	388	6	2,328	53	0.02	39	0.02	88	0.04	34,918	15.00
	Aug 26 <sup>b</sup>	323	6	1,938	27	0.01	31	0.02	55	0.03	19,039	9.82
Total		679	102	45,102	29,442		67,681		267,936		195,816	

-continued-

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1984	Jun 18 <sup>a</sup>	484	6	2,904	10,845	3.73	409	0.14	5,803	2.00	0	0.0
	Jun 21 <sup>a</sup>	443	6	2,658	6,336	2.38	2,618	0.98	22,094	8.31	0	0.0
	Jun 25 <sup>b</sup>	466	6	2,796	3,018	1.08	10,743	3.84	91,773	32.82	0	0.0
	Jun 28 <sup>b</sup>	470	6	2,820	2,625	0.93	10,942	3.88	67,120	23.80	0	0.0
	Jul 02 <sup>b</sup>	483	6	2,898	1,988	0.69	8,145	2.81	69,897	24.12	0	0.0
	Jul 05 <sup>b</sup>	426	6	2,556	1,218	0.48	6,798	2.66	54,981	21.51	1	0.0
	Jul 09 <sup>b</sup>	496	6	2,976	1,211	0.41	2,821	0.95	36,440	12.24	52	0.0
	Jul 12 <sup>b</sup>	436	6	2,616	858	0.33	12/27	0.84	24,269	9.28	196	0.1
	Jul 16 <sup>b</sup>	373	6	2,238	744	0.33	1,121	0.50	18,613	8.32	619	0.3
	Jul 30 <sup>b</sup>	459	6	2,754	351	0.13	281	0.10	2,329	0.85	56,609	20.6
	Aug 02 <sup>b</sup>	401	6	2,406	291	0.12	157	0.07	1,184	0.49	79,240	32.9
	Aug 06 <sup>b</sup>	542	9	4,878	106	0.02	113	0.02	639	0.13	84,406	17.3
	Aug 09 <sup>b</sup>	523	9	4,707	106	0.02	111	0.02	373	0.08	80,990	17.2
	Aug 13 <sup>b</sup>	504	9	4,536	81	0.02	67	0.01	235	0.05	80,268	17.7
	Aug 16 <sup>b</sup>	502	9	4,518	50	0.01	29	0.01	131	0.03	78,342	17.3
	Aug 20 <sup>b</sup>	491	9	4,419	33	0.01	14	0.00	59	0.01	63,829	14.4
	Aug 23 <sup>b</sup>	481	9	4,329	21	0.00	11	0.00	63	0.01	49,372	11.4
	Aug 27 <sup>b</sup>	350	9	3,150	53	0.02	2	0.00	18	0.01	16,472	5.2
	Aug 30 <sup>b</sup>	210	9	1,890	9	0.00	1	0.00	5	0.00	11,222	5.9
	Sept 03 <sup>b</sup>	69	5	360	2	0.01	0	0.00	5	0.01	1,603	4.5
	Sept 06 <sup>b</sup>	39	6	234	0	0.00	0	0.00	0	0.00	1,877	8.0
Total		654	149	62,643	29,946		46,571		396,031		605,098	
1985	Jun 20	423	6	2,538	6,519	2.57	5,246	2.07	19,762	7.79	0	0.00
	Jun 24	488	6	2,928	10,413	3.56	25,536	8.72	42,778	14.61	0	0.00
	Jun 27	492	6	2,952	8,791	2.98	26,155	8.86	47,443	16.07	0	0.00
	Jul 1	514	6	3,084	6,168	2.00	31,082	10.08	47,471	15.39	0	0.00
	Jul 4	460	6	2,760	3,774	1.37	16,114	5.84	28,581	10.36	0	0.00
	Aug 01	487	6	2,922	204	0.07	174	0.06	2,470	0.85	34,052	11.65
	Aug 05	527	6	3,162	121	0.04	33	0.01	1,558	0.49	54,819	17.34
	Aug 08	525	6	3,150	58	0.02	3	0.00	472	0.15	78,149	24.81
	Aug 12	530	6	3,180	44	0.01	7	0.00	342	0.11	77,809	24.47
	Aug 15	441	6	2,646	28	0.01	0	0.00	193	0.07	28,013	10.59
	Aug 19	406	6	2,436	13	0.01	2	0.00	32	0.01	19,316	7.93
	Aug 22	390	6	2,340	10	0.00	0	0.00	56	0.02	17,534	7.49
	Aug 26	297	6	1,782	8	0.00	0	0.00	22	0.01	10,688	6.00
	Aug 29	262	6	1,572	8	0.01	1	0.00	28	0.02	9,568	6.09
Total		654	84	37,452	36,159		104,353		191,208		329,948	
1986	Jun 26	514	6	3,084	7,786	2.52	40,468	13.12	68,947	22.36	1	0.00
	Jun 30	576	6	3,456	4,200	1.22	22,633	6.55	60,780	17.59	0	0.00
	Jul 03	556	6	3,336	3,224	0.97	15,766	4.73	65,839	19.74	0	0.00
	Jul 07	586	6	3,516	1,805	0.51	8,347	2.37	55,983	15.92	0	0.00
	Jul 10	532	6	3,192	1,156	0.36	5,488	1.72	48,990	15.35	0	0.00
	Jul 31	352	6	2,112	60	0.03	219	0.10	2,239	1.06	27,553	13.05
	Aug 04	530	6	3,180	49	0.02	201	0.06	1,345	0.42	96,127	30.23
	Aug 07	600	9	5,400	66	0.01	38	0.01	50	0.01	127,024	23.52
	Aug 11	553	6	3,318	32	0.01	3	0.00	9	0.00	82,215	24.78
	Aug 13	526	6	3,156	32	0.01	2	0.00	3	0.00	92,918	29.44
	Aug 15	519	6	3,114	67	0.02	4	0.00	11	0.00	55,633	17.87
	Aug 18	477	6	2,862	15	0.01	4	0.00	0	0.00	51,328	17.93
	Aug 21	465	6	2,790	8	0.00	2	0.00	2	0.00	50,640	18.15
	Aug 25	458	6	2,748	4	0.00	0	0.00	0	0.00	37,365	13.60
	Aug 28	346	6	2,076	0	0.00	0	0.00	3	0.00	16,436	7.92
	Sept 01	234	6	1,404	6	0.00	0	0.00	0	0.00	5,949	4.24
Total		688	99	48,744	18,510		93,175		304,201		643,189	

-continued-



Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1987	Jun 18	526	9	4,734	19,126	4.04	9,508	2.01	14,137	2.99	0	0.00
	Jun 24	607	9	5,463	0 <sup>c</sup>	0.00	24,355	4.46	54,454	9.97	0	0.00
	Jun 30	564	9	5,076	0 <sup>c</sup>	0.00	39,112	7.71	112,963	22.25	0	0.00
	Jul 03	580	6	3,480	5,970	1.72	44,030	12.65	66,783	19.19	0	0.00
	Jul 07	578	6	3,468	3,636	1.05	9,196	2.65	103,059	29.72	0	0.00
	Jul 11	597	6	3,582	1,910	0.53	4,611	1.29	72,118	20.13	1	0.00
	Jul 15	569	6	3,414	1,415	0.41	2,301	0.67	71,923	21.07	10	0.00
	Jul 20	551	6	3,306	1,343	0.41	826	0.25	65,135	19.70	500	0.15
	Aug 06	590	6	3,540	207	0.06	271	0.08	4,074	1.15	49,182	13.89
	Aug 13	604	6	3,624	103	0.03	222	0.06	894	0.25	104,968	28.96
	Aug 17	595	6	3,570	76	0.02	133	0.04	378	0.11	73,867	20.69
	Aug 19	585	6	3,510	36	0.01	25	0.01	156	0.04	45,277	12.90
	Aug 21	540	6	3,240	26	0.01	16	0.00	140	0.04	33,601	10.37
	Aug 24	500	6	3,000	27	0.01	4	0.00	108	0.04	27,607	9.20
	Aug 27	479	6	2,874	13	0.00	9	0.00	70	0.02	21,772	7.58
	Aug 31	364	6	2,184	7	0.00	5	0.00	57	0.03	12,873	5.89
	Sept 03	278	6	1,668	8	0.00	3	0.00	31	0.02	11,352	6.81
	Sept 07	132	6	792	4	0.01	4	0.01	19	0.02	4,311	5.44
Total		703	117	60,525	33,907		134,631		566,499		385,321	
1988	Jun 16	602	8	4,816	12,640	2.62	7,408	1.54	72,219	15.00	0	0.00
	Jun 20	612	6	3,672	11,708	3.19	14,502	3.95	113,628	30.94	0	0.00
	Jun 24	644	6	3,864	9,710	2.51	19,894	5.15	119,808	31.01	0	0.00
	Jun 28	609	6	3,654	5,350	1.46	17,628	4.82	154,027	42.15	0	0.00
	Jul 02	580	6	3,480	3,531	1.01	15,102	4.34	187,916	54.00	0	0.00
	Jul 05	579	6	3,474	2,340	0.67	7,284	2.10	163,971	47.20	9	0.00
	Jul 08	604	6	3,624	1,891	0.52	3,623	1.00	138,772	38.29	1	0.00
	Jul 11	598	6	3,588	1,628	0.45	2,467	0.69	137,450	38.31	24	0.01
	Jul 14	597	6	3,582	1,751	0.49	822	0.23	116,930	32.64	141	0.04
	Jul 18	567	6	3,402	1,107	0.33	396	0.12	57,749	16.98	502	0.15
	Jul 21	539	6	3,234	621	0.19	164	0.05	39,643	12.26	1,278	0.40
	Jul 25	494	6	2,964	329	0.11	109	0.04	24,893	8.40	6,323	2.13
	Jul 28	552	6	3,312	333	0.10	70	0.02	16,028	4.84	20,970	6.33
	Aug 01	594	6	3,564	201	0.06	32	0.01	6,967	1.95	33,954	9.53
	Aug 04	639	6	3,834	206	0.05	105	0.03	5,152	1.34	76,576	19.97
	Aug 08	640	6	3,840	114	0.03	92	0.02	2,890	0.75	76,345	19.88
	Aug 10	596	6	3,576	73	0.02	9	0.00	1,376	0.38	53,874	15.07
	Aug 12	624	6	3,744	115	0.03	11	0.00	1,422	0.38	84,700	22.62
	Aug 15	613	6	3,678	76	0.02	14	0.00	663	0.18	59,724	16.24
	Aug 18	620	6	3,720	37	0.01	8	0.00	230	0.06	37,415	10.06
	Aug 20	577	6	3,462	29	0.01	5	0.00	121	0.03	24,046	6.95
	Aug 27	532	6	3,192	14	0.00	8	0.00	93	0.03	22,683	7.11
	Aug 31	408	6	2,448	6	0.00	11	0.00	34	0.01	9,852	4.02
Total		746	140	81,724	53,810		89,764		1,361,982		508,417	
1989	Jun 19	374	8	2,992	9,204	3.08	5,495	1.84	41,789	13.97	0	0.0
	Jun 23	277	8	2,216	6,011	2.71	7,011	3.16	65,650	29.63	0	0.0
	Jun 26	126	8	1,008	1,862	1.85	3,746	3.72	32,373	32.12	0	0.0
	Jun 30	642	8	5,136	9,232	1.80	10,214	1.99	131,629	25.63	0	0.0
	Jul 03	629	6	3,774	4,600	1.22	5,808	1.54	91,345	24.20	0	0.0
	Jul 05	553	6	3,318	3,311	1.00	2,917	0.88	85,727	25.84	3	0.0
	Jul 08	621	6	3,726	3,136	0.84	3,177	0.85	119,066	31.96	9	0.0
	Jul 11	616	6	3,696	1,691	0.46	1,565	0.42	78,053	21.12	126	0.0
	Jul 14	590	6	3,540	1,216	0.34	796	0.22	44,401	12.54	230	0.0
	Jul 18	437	6	2,622	868	0.33	451	0.17	26,407	10.07	2,216	0.1
	Jul 27	562	6	3,372	210	0.06	95	0.03	5,716	1.70	5,651	0.7
	Aug 03	679	6	4,074	174	0.04	30	0.01	3,615	0.89	99,022	24.3
	Aug 07	642	6	3,852	78	0.02	22	0.01	868	0.23	73,514	19.1
	Aug 09	644	6	3,864	40	0.01	7	0.00	432	0.11	103,158	26.7
	Aug 12	650	6	3,900	34	0.01	8	0.00	122	0.03	81,970	21.0
	Aug 15	616	6	3,696	25	0.01	4	0.00	119	0.03	23,071	6.2
	Aug 18	381	6	2,286	7	0.00	5	0.00	16	0.01	5,938	2.6
	Aug 23	528	6	3,168	19	0.01	14	0.00	21	0.01	30,940	9.8
	Aug 26	508	6	3,048	17	0.01	13	0.00	15	0.00	20,881	6.9
	Aug 29	423	6	2,538	7	0.00	9	0.00	21	0.01	11,080	4.4
	Sept 01	194	6	1,164	3	0.00	1	0.00	7	0.01	3,225	2.8
Total		745	134	66,990	41,745		41,388		727,392		461,034	

-continued-

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1990	Jun 20	630	6	3,780	16,690	4.42	10,318	16.38	30,306	8.02	0	0.00
	Jun 25	611	6	3,666	16,031	4.37	27,024	44.23	58,944	16.08	0	0.00
	Jun 29	645	6	3,870	9,428	2.44	18,774	29.11	74,911	19.36	0	0.00
	Jul 05	591	6	3,546	4,071	1.15	10,759	18.20	86,835	24.49	0	0.00
	Jul 09	589	6	3,534	2,804	0.79	8,757	14.87	91,411	25.87	0	0.00
	Jul 14	625	8	5,000	2,127	0.43	5,467	8.75	79,803	15.96	70	0.01
	Aug 01	611	6	3,666	252	0.07	533	0.87	9,065	2.47	23,549	6.42
	Aug 06	631	6	3,786	306	0.08	133	0.21	4,597	1.21	61,450	16.23
	Aug 10	653	6	3,918	94	0.02	66	0.10	1,269	0.32	58,251	14.87
	Aug 13	642	6	3,852	38	0.01	48	0.07	509	0.13	115,444	29.97
	Aug 16	650	9	5,850	28	0.00	29	0.04	239	0.04	68,605	11.73
	Aug 20	594	6	3,564	11	0.00	34	0.06	113	0.03	51,838	14.54
	Aug 27	534	6	3,204	3	0.00	16	0.03	25	0.01	16,030	5.00
Total		743	83	51,236	51,883		81,958		438,027		395,237	
1991	Jun 20	601	6	3,606	13,813	3.83	19,732	5.47	13,266	3.68	0	0.00
	Jun 24	616	6	3,696	12,612	3.41	19,262	5.21	30,632	8.29	0	0.00
	Jul 01	629	6	3,774	5,966	1.58	24,428	6.47	50,121	13.28	0	0.00
	Jul 06	589	6	3,534	2,102	0.59	24,219	6.85	40,060	11.34	0	0.00
	Jul 13	571	6	3,426	904	0.26	6,458	1.88	52,552	15.34	16	0.00
	Jul 18	568	6	3,408	452	0.13	5,128	1.50	78,797	23.12	977	0.29
	Jul 22	543	6	3,258	233	0.07	3,085	0.95	49,788	15.28	2,655	0.81
	Jul 25	533	8	4,264	186	0.04	1,526	0.36	30,083	7.06	4,871	1.14
	Jul 29	534	8	4,272	134	0.03	732	0.17	24,026	5.62	37,141	8.69
	Aug 01	602	6	3,612	125	0.03	624	0.17	13,098	3.63	38,284	10.60
	Aug 05	643	8	5,144	56	0.01	96	0.02	6,091	1.18	56,262	10.94
	Aug 08	634	8	5,072	33	0.01	40	0.01	3,194	0.63	72,037	14.20
	Aug 12	662	8	5,296	42	0.01	31	0.01	1,586	0.30	114,581	21.64
	Aug 14	601	8	4,808	18	0.00	23	0.00	634	0.13	58,393	12.14
	Aug 19	590	6	3,540	24	0.01	24	0.01	313	0.09	57,364	16.20
	Aug 26	512	8	4,096	6	0.00	12	0.00	93	0.02	43,664	10.66
Total		749	110	64,806	36,706		105,420		394,334		486,245	
1992	Jun 18	567	8	4,536	9,756	2.15	8,508	1.88	32,695	7.21	0	0.00
	Jun 22	619	8	4,952	14,578	2.94	25,017	5.05	74,429	15.03	0	0.00
	Jun 25	627	8	5,016	8,984	1.79	21,922	4.37	55,114	10.99	0	0.00
	Jun 29	602	6	3,612	7,323	2.03	26,082	7.22	80,213	22.21	0	0.00
	Jul 06	587	8	4,696	3,250	0.69	7,962	1.70	84,196	17.93	2	0.00
	Aug 03	619	8	4,952	306	0.06	137	0.03	4,069	0.82	78,233	15.80
	Aug 06	590	6	3,540	116	0.03	98	0.03	1,319	0.37	57,506	16.24
	Aug 11	653	6	3,918	157	0.04	76	0.02	664	0.17	181,905	46.43
	Aug 14	632	6	3,792	63	0.02	55	0.01	196	0.05	87,959	23.20
	Aug 17	596	6	3,576	47	0.01	49	0.01	122	0.03	79,357	22.19
	Aug 20	578	6	3,468	36	0.01	17	0.00	53	0.02	73,363	21.15
	Aug 24	550	6	3,300	27	0.01	19	0.01	23	0.01	28,069	8.51
	Aug 27	481	6	2,886	26	0.01	6	0.00	26	0.01	28,238	9.78
	Aug 31	374	6	2,244	8	0.00	8	0.00	17	0.01	16,962	7.56
Total		741	94	54,488	44,677		89,956		333,136		631,594	
1993	Jun 25	622	8	4,976	8,184	1.64	26,363	5.30	34,123	6.86	0	0.00
	Jul 31	625	6	3,750	172	0.05	210	0.06	4,133	1.10	56,107	14.96
	Aug 04	656	6	3,936	98	0.02	141	0.04	2,080	0.53	137,649	34.97
	Aug 06	632	8	5,056	88	0.02	84	0.02	1,396	0.28	91,400	18.08
	Aug 09	628	6	3,768	65	0.02	75	0.02	446	0.12	54,817	14.55
	Aug 14	640	6	3,840	46	0.01	39	0.01	287	0.07	80,226	20.89
	Aug 17	620	6	3,720	30	0.01	31	0.01	119	0.03	82,696	22.23
	Aug 21	592	6	3,552	9	0.00	25	0.01	58	0.02	47,097	13.26
	Aug 25	441	6	2,646	6	0.00	13	0.00	28	0.01	10,556	3.99
	Aug 28	387	6	2,322	12	0.01	19	0.01	30	0.01	13,592	5.85
	Sept 01	274	6	1,644	4	0.00	3	0.00	18	0.01	12,190	7.41
Total		739	70	39,210	8,714		27,003		42,718		586,330	

-continued-

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1994	Jun 24	576	8	4,608	14,221	3.09	38,958	8.45	87,214	18.93	0	0.00
	Jul 14	496	4	1,984	578	0.29	3,891	1.96	43,585	21.97	820	0.41
	Jul 19	500	6	3,000	441	0.15	4,475	1.49	60,104	20.03	7,027	2.34
	Jul 23	506	6	3,036	313	0.10	1,125	0.37	38,149	12.57	24,213	7.98
	Jul 26	552	6	3,312	225	0.09	471	0.14	22,460	6.78	39,901	12.05
	Jul 29	577	6	3,462	204	0.06	159	0.05	11,252	3.25	52,090	15.05
	Aug 04	606	6	3,636	88	0.06	87	0.02	3,983	1.10	75,514	20.77
	Aug 09	530	6	3,180	29	0.03	70	0.02	1,153	0.36	129,570	40.75
	Aug 12	606	8	4,848	34	0.01	47	0.01	777	0.16	117,753	24.29
	Aug 15	595	8	4,760	22	0.01	33	0.01	321	0.07	47,902	10.06
	Aug 18	598	8	4,784	20	0.00	16	0.00	212	0.04	82,750	17.30
	Aug 22	554	8	4,432	12	0.00	15	0.00	104	0.02	44,054	9.94
	Aug 25	447	8	3,576	9	0.00	7	0.00	63	0.02	37,595	10.51
	Aug 27	445	6	2,670	3	0.00	4	0.00	30	0.01	20,526	7.69
	Aug 30	263	6	1,578	2	0.00	2	0.00	16	0.01	8,192	5.19
	Sept 02	157	6	942			2	0.00	3	0.00	2,489	2.64
Total		706	106	53,808	16,201		49,362		269,426		690,396	
1995	Jun 22	569	4	2,276	6,895	3.03	4,420	1.94	49,157	21.60	0	0.00
	Jun 26	568	4	2,272	9,452	4.16	19,449	8.56	93,152	41.00	0	0.00
	Jun 29	565	4	2,260	4,972	2.20	18,188	8.05	83,580	36.98	0	0.00
	Jul 03	475	4	1,900	2,847	1.50	17,078	8.99	89,427	47.07	0	0.00
	Jul 06	481	4	1,924	1,521	0.79	14,765	7.67	81,246	42.23	0	0.00
	Jul 10	494	4	1,976	906	0.46	7,100	3.59	86,368	43.71	21	0.01
	Jul 14	435	4	1,740	546	0.31	4,219	2.42	43,137	24.79	221	0.13
	Jul 18	336	6	2,016	366	0.18	2,482	1.23	37,294	18.50	671	0.33
	Jul 21	368	4	1,472	202	0.14	940	0.64	21,039	14.29	1,272	0.86
	Aug 04	234	6	1,404	64	0.05	123	0.09	1,072	0.76	48,665	34.66
	Aug 08	611	6	3,666	95	0.03	363	0.10	1,229	0.34	98,548	26.88
	Aug 12	617	6	3,702	50	0.01	359	0.10	899	0.24	102,421	27.67
	Aug 16	593	6	3,558	52	0.01	147	0.04	208	0.06	65,713	18.47
	Aug 19	555	6	3,330	28	0.01	87	0.03	133	0.04	41,057	12.33
	Aug 22	497	6	2,982	16	0.01	113	0.04	157	0.05	43,978	14.75
	Aug 26	477	6	2,862	25	0.01	117	0.04	101	0.04	29,129	10.18
	Aug 29	355	6	2,130	15	0.01	45	0.02	39	0.02	17,790	8.35
	Sept 01	219	6	1,314	2	0.00	31	0.02	12	0.01	5,783	4.40
Total		712	92	42,784	28,054		90,026		588,250		455,269	
1996	Jun 17	245	2	490	2,045	4.17	1,850	3.78	11,560	23.59	0	0.00
	Jun 20	283	2	566	2,046	3.61	6,423	11.35	27,442	48.48	0	0.00
	Jun 24	240	1.5	360	666	1.85	4,420	12.28	19,438	53.99	0	0.00
	Jul 02	224	2	448	545	1.22	3,962	8.84	20,915	46.69	0	0.00
	Jul 05	194	2	388	316	0.81	3,481	8.97	17,651	45.49	2	0.01
	Jul 08	211	2	422	178	0.42	6,795	16.10	18,801	44.55	24	0.06
	Jul 12	237	2	474	230	0.49	3,781	7.98	26,468	55.84	1,608	3.39
	Jul 16	197	2	394	87	0.22	602	1.53	15,192	38.56	4,675	11.87
	Jul 19	267	3	801	164	0.20	298	0.37	13,390	16.72	14,746	18.41
	Jul 22	417	6	2,502	183	0.07	639	0.26	14,504	5.80	50,443	20.16
	Jul 25	487	8	3,896	124	0.03	256	0.07	9,024	2.32	113,637	29.17
	Jul 29	526	6	3,156	97	0.03	186	0.06	3,828	1.21	144,773	45.87
	Jul 31	464	6	2,784	52	0.02	92	0.03	1,541	0.55	122,946	44.16
	Aug 03	541	6	3,246	59	0.02	129	0.04	1,097	0.34	132,540	40.83
	Aug 07	514	6	3,084	43	0.01	73	0.02	581	0.19	94,332	30.59
	Aug 10	502	6	3,012	45	0.01	60	0.02	797	0.26	83,653	27.77
	Aug 13	471	6	2,826	25	0.01	82	0.03	296	0.10	70,053	24.79
	Aug 16	459	6	2,754	28	0.01	147	0.05	215	0.08	49,012	17.80
	Aug 20	400	6	2,400	19	0.01	83	0.03	51	0.02	25,870	10.78
	Aug 23	293	6	1,758	9	0.01	22	0.01	23	0.01	13,133	7.47
	Aug 26	209	6	1,254	11	0.01	23	0.02	13	0.01	8,684	6.93
Total		620	92.5	37,015	6,972		33,404		202,827		930,131	
1997	Jun 23 <sup>c</sup>	353	6	2,118	10,023	4.73	21,218	10.02	13,090	6.18	0	0.00
	Jul 31 <sup>c</sup>	429	6	2,574	141	0.05	352	0.14	2,060	0.80	14,963	5.81
	Aug 6	513	6	3,078	145	0.05	229	0.07	1,387	0.45	37,216	12.09
	Aug 12	507	6	3,042	61	0.02	122	0.04	408	0.13	56,149	18.46
	Aug 18	475	6	2,850	66	0.02	67	0.02	58	0.02	21,273	7.46
Total		604	30	13,662	10,436		21,988		17,003		129,601	

-continued-

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1997	Jun 23	353	6	2,118	10,023	4.73	21,218	10.02	13,090	6.18		
	Jul 31	429	6	2,574	141	0.05	352	0.14	2,060	0.80	14,963	5.81
	Aug 06	513	6	3,078	145	0.05	229	0.07	1,387	0.45	37,216	12.09
	Aug 12	509	6	3,042	62	0.02	122	0.04	431	0.13	56,643	18.46
	Aug 18	478	6	2,850	70	0.02	68	0.02	58	0.02	21,981	7.46
Total		607	30.0	13,662	10,441		21,989		17,026		130,803	
1998	Jun 24	338	6	2,028	6,413	3.16	9,043	4.46	32,467	16.01		
	Jun 29	426	6	2,556	6,358	2.49	22,506	8.81	66,789	26.13		
	Jul 03	445	4	1,780	2,277	1.28	15,985	8.98	51,471	28.92	1	0.00
	Jul 11	417	4	1,668	1,127	0.68	10,172	6.10	29,407	17.63	23	0.01
	Jul 22	346	6	2,076	460	0.22	1,538	0.74	15,663	7.54	3,633	1.75
	Jul 27	370	6	2,220	356	0.16	932	0.42	7,500	3.38	18,497	8.33
	Aug 01	425	6	2,550	156	0.06	235	0.09	2,787	1.09	26,791	10.51
	Aug 06	496	6	2,976	88	0.03	295	0.10	1,020	0.34	45,128	15.16
	Aug 11	464	6	2,784	67	0.02	95	0.03	388	0.14	58,426	20.99
	Aug 17	439	6	2,634	34	0.01	45	0.02	122	0.05	34,640	13.15
	Aug 22	382	6	2,292	19	0.01	53	0.02	67	0.03	18,936	8.26
	Aug 29	154	6	924	1	0.00	7	0.01	17	0.02	4,093	4.43
Total		615	68	26,488	17,356		60,906		207,698		210,168	

<sup>a</sup> Gillnet mesh size unrestricted.

<sup>b</sup> Gillnets were restricted to 6 inches or less; after 1985 this restriction was in effect for all periods.

<sup>c</sup> Sales of chinook salmon were prohibited. Estimated chinook harvest was between 12,119 and 13,615 on 6/24 and between 5,831 and 6,555 on 6/25.

Appendix B.19. Historical commercial salmon catches by fishing period in Kuskokwim Area District 2.

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1974	Jun 10 - 14 <sup>a</sup>	26	96	2,496	549	0.2	0	0.0	16	0.0	0	0.00
	Jun 17 - 19 <sup>a</sup>	29	48	1,392	402	0.3	0	0.0	451	0.3	0	0.00
	Aug 5 - 9 <sup>a</sup>	14	96	1,344	2	0.0	0	0.0	210	0.2	990	0.7
	Aug 12 - 13 <sup>a</sup>	13	24	312	0	0.0	0	0.0	11	0.0	1,428	4.6
Total		37	264	5,544	953		0		688		2,418	
1975	Jun 23 - 27 <sup>a</sup>	38	96	3,648	1,319	0.4	0	0.0	2,385	0.7	0	0.00
Total		38	96	3,648	1,319		0		2,385		0	
1976	Jun 21 - 24 <sup>a</sup>	55	66	3,630	3,316	0.9	0	0.0	1,136	0.3	0	0.00
	Aug 23 - 25 <sup>a</sup>	11	24	264	1	0.0	0	0.0	1	0.0	568	2.15
Total		57	90	3,894	3,317		0		1,137		568	
1977	Jun 20 - 21 <sup>a</sup>	83	30	2,490	3,975	1.6	0	0.0	756	0.3	0	0.00
	Jul 4 <sup>a</sup>	54	12	648	195	0.3	10	0.0	15,160	23.4	0	0.00
	Aug 8 <sup>a</sup>	24	12	288	1	0.0	0	0.0	124	0.4	3,705	12.86
Total		105	54	3,426	4,171		10		16,040		3,705	
1978	Jun 14 <sup>a</sup>	8	6	48	359	7.5	0	0.0	59	1.2	0	0.0
	Jun 16 <sup>a</sup>	13	6	78	424	5.4	0	0.0	189	2.4	0	0.0
	Jun 22 <sup>a</sup>	9	4	36	411	11.4	0	0.0	377	10.5	0	0.0
	Jun 23 <sup>a</sup>	24	4	96	893	9.3	0	0.0	804	8.4	0	0.0
	Aug 18 <sup>b</sup>	3	12	36	0	0.0	0	0.0	0	0.0	257	7.14
	Aug 22 <sup>b</sup>	17	12	204	1	0.0	0	0.0	8	0.0	2,346	11.50
Total		43	44	498	2,088		0		1,437		2,603	
1979	Jun 21 <sup>a</sup>	29	12	348	1,030	3.0	142	0.4	982	2.8	0	0.00
	Jun 25 <sup>a</sup>	33	12	396	1,883	4.8	452	1.1	1,946	4.9	0	0.00
	Aug 13 <sup>b</sup>	20	12	240	0	0.0	0	0.0	430	1.8	3,630	15.13
Total		43	36	984	2,913		594		3,358		3,630	
1980	Jun 23 <sup>a</sup>	37	12	444	1,482	3.3	0	0.0	4,004	9.0	0	0.00
	Jul 09 <sup>b</sup>	21	6	126	215	1.7	0	0.0	11,911	94.5	0	0.00
	Aug 14 <sup>b</sup>	12	12	144	0	0.0	0	0.0	702	4.9	2,868	19.92
Total		43	30	714	1,697		0		16,617		2,868	
1981	Jun 16 <sup>a</sup>	18	6	108	933	8.6	4	0.0	810	7.5	0	0.00
	Jun 19 <sup>a</sup>	151	6	906	3,838	4.2	125	0.1	3,902	4.3	0	0.00
	Jun 25 <sup>b</sup>	11	6	66	499	7.6	0	0.0	3,329	50.4	0	0.00
	Aug 17 <sup>b</sup>	15	6	90	0	0.0	0	0.0	62	0.7	1,487	16.52
	Aug 20 <sup>b</sup>	13	6	78	1	0.0	0	0.0	32	0.4	1,896	24.31
Total		153	30	1,248	5,271		129		8,135		3,383	
1982	Jun 17 <sup>a</sup>	10	6	60	222	3.7	19	0.3	274	4.6	0	0.00
	Jun 21 <sup>a</sup>	23	6	138	769	5.6	53	0.4	817	5.9	0	0.00
	Jun 24 <sup>a</sup>	35	6	210	1,122	5.3	434	2.1	1,912	9.1	0	0.00
	Jul 2 <sup>b</sup>	24	6	144	271	1.9	607	4.2	7,060	49.0	0	0.00
	Jul 5 <sup>b</sup>	47	6	282	398	1.4	808	2.9	8,811	31.2	0	0.00
	Aug 9 <sup>b</sup>	15	6	90	2	0.0	0	0.0	144	1.6	1,841	20.46
	Aug 16 <sup>b</sup>	13	6	78	0	0.0	0	0.0	29	0.4	4,567	58.55
	Aug 19 <sup>b</sup>	21	6	126	1	0.0	0	0.0	5	0.0	5,352	42.48
Total		60	48	1,128	2,785		1,921		19,052		11,760	
1983	Jun 16 <sup>a</sup>	14	6	84	510	6.1	13	0.2	165	2.0	0	0.00
	Jun 20 <sup>b</sup>	28	6	168	746	4.4	86	0.5	2,069	12.3	0	0.00
	Jun 23 <sup>b</sup>	34	6	204	820	4.0	338	1.7	2,154	10.6	0	0.00
	Jun 27 <sup>b</sup>	33	6	198	755	3.8	736	3.7	4,276	21.6	0	0.00
	Aug 11 <sup>b</sup>	9	6	54	0	0.0	1	0.0	98	1.8	471	8.72
	Aug 15 <sup>b</sup>	0	6	0	0	0.0	0	0.0	0	0.0	0	0.00
	Aug 18 <sup>b</sup>	0	6	0	0	0.0	0	0.0	0	0.0	0	0.00
Total		43	42	708	2,831		1,174		8,762		471	

-continued-

## Appendix B.19. (page 2 of 4)

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1984	Jun 21 <sup>a</sup>	15	6	90	561	6.23	84	0.93	967	10.74	0	0.00
	Jun 25 <sup>b</sup>	25	6	150	493	3.29	543	3.62	5,705	38.03	0	0.00
	Jun 28 <sup>b</sup>	33	6	198	524	2.65	395	1.99	13,376	67.56	0	0.00
	Jul 2 <sup>b</sup>	25	6	150	204	1.36	982	6.55	7,420	49.47	0	0.00
	Aug 06 <sup>b</sup>	16	6	96	9	0.09	0	0.00	110	1.15	4,339	45.20
	Aug 09 <sup>b</sup>	11	6	66	1	0.02	0	0.00	69	1.05	4,340	65.76
	Aug 13 <sup>b</sup>	12	6	72	1	0.01	0	0.00	24	0.33	2,792	38.78
	Aug 16 <sup>b</sup>	17	6	102	1	0.01	0	0.00	16	0.16	3,652	35.80
	Aug 20 <sup>b</sup>	13	6	78	1	0.01	0	0.00	0	0.00	2,179	27.94
	Aug 23 <sup>b</sup>	8	6	48	0	0.00	0	0.00	0	0.00	1,047	21.81
	Aug 27 <sup>b</sup>	0	6	0	0	0.00	0	0.00	0	0.00	0	0.00
	Aug 30 <sup>b</sup>	0	6	0	0	0.00	0	0.00	0	0.00	0	0.00
Total		58	72	1,050	1,795		2,004		27,687		18,349	
1985	Jun 20	8	6	48	136	2.83	115	2.40	647	13.48	0	0.00
	Jun 24	11	6	66	263	3.98	340	5.15	2,411	36.53	0	0.00
	Jun 27	12	6	72	548	7.61	739	10.26	2,263	31.43	0	0.00
	Jul 1	15	6	90	779	8.66	1,100	12.22	2,854	31.71	0	0.00
	Jul 4	0	6	0	0	0.00	0	0.00	0	0.00	0	0.00
	Aug 08	6	6	36	0	0.00	0	0.00	41	1.14	739	20.53
	Aug 12	14	6	84	3	0.04	0	0.00	45	0.54	2,914	34.69
	Aug 15	11	6	66	1	0.02	0	0.00	9	0.14	2,005	30.38
Total		23	48	462	1,730		2,294		8,270		5,658	
1986	Jun 26	3	6	18	186	10.33	616	34.22	439	24.39	0	0.00
	Jun 30	13	6	78	386	4.95	1,171	15.01	1,619	20.76	0	0.00
	Jul 3	8	6	48	168	3.50	265	5.52	1,249	26.02	0	0.00
	Jul 7	2	6	12	117	9.75	26	2.17	387	32.25	0	0.00
	Jul 10	6	6	36	45	1.25	179	4.97	1,282	35.61	0	0.00
	Aug 07	8	6	48	0	0.00	0	0.00	0	0.00	2,445	50.94
	Aug 11	10	6	60	0	0.00	0	0.00	23	0.38	2,677	44.62
	Aug 13	10	6	60	0	0.00	1	0.02	13	0.22	2,787	46.45
	Aug 15	27	6	162	1	0.01	0	0.00	0	0.00	5,761	35.56
	Aug 18	8	6	48	1	0.02	0	0.00	0	0.00	1,804	37.58
	Aug 21	6	6	36	0	0.00	0	0.00	0	0.00	1,325	36.81
Total		43	66	606	904		2,258		5,012		16,799	
1987	Jul 03	15	6	90	1,325	14.72	511	5.68	3,200	35.56	0	0.00
	Jul 07	22	6	132	935	7.08	1,459	11.05	4,152	31.45	0	0.00
	Aug 13	14	6	84	4	0.05	1	0.01	304	3.62	2,273	27.06
	Aug 17	14	6	84	6	0.07	0	0.00	102	1.21	3,374	40.17
	Aug 19	13	6	78	1	0.01	0	0.00	39	0.50	3,928	50.36
	Aug 21	18	6	108	1	0.01	0	0.00	40	0.37	4,571	42.32
Total		29	36	576	2,272		1,971		7,837		14,146	
1988	Jun 24	13	6	78	669	8.58	1,041	13.35	4,232	54.26	0	0.00
	Jun 28	17	6	102	746	7.31	639	6.26	6,087	59.68	0	0.00
	Jul 2	19	6	114	468	4.11	579	5.08	8,155	71.54	0	0.00
	Aug 08	14	6	84	6	0.07	0	0.00	308	3.67	1,465	17.44
	Aug 10	16	6	96	10	0.10	0	0.00	312	3.25	3,823	39.82
	Aug 12	20	6	120	3	0.03	2	0.02	244	2.03	5,216	43.47
	Aug 15	21	6	126	1	0.01	0	0.00	144	1.14	2,317	18.39
	Aug 18	15	6	90	2	0.02	0	0.00	116	1.29	1,485	16.50
	Aug 20	17	6	102	1	0.01	0	0.00	94	0.92	1,573	15.42
Total		29	54	912	1,906		2,261		19,692		15,879	

-continued-



## Appendix B.19. (page 3 of 4)

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1989	Jun 30	15	8	120	610	5.08	587	4.89	7,353	61.28	0	0.0
	Jul 03	18	6	108	371	3.44	238	2.20	5,101	47.23	0	0.0
	Jul 05	14	6	84	264	3.14	176	2.10	3,542	42.17	0	0.0
	Jul 11	14	6	84	128	1.52	95	1.13	4,580	54.52	0	0.0
	Aug 07	22	6	132	3	0.02	0	0.00	238	1.80	6,607	50.1
	Aug 09	18	6	108	3	0.03	0	0.00	114	1.06	5,714	52.9
	Aug 15	15	6	90	1	0.01	0	0.00	7	0.08	1,867	20.7
	Aug 18	20	6	120	3	0.03	0	0.00	11	0.09	2,733	22.8
Total		30	50	846	1,383		1,096		20,946		16,921	
1990	Jun 29	14	6	84	641	7.63	735	8.75	3,838	45.69	0	0.0
	Jul 05	15	6	90	467	5.19	561	6.23	4,397	48.86	0	0.0
	Jul 09	17	6	102	255	2.50	580	5.69	5,163	50.62	0	0.0
	Jul 14	17	8	136	209	1.54	567	4.17	6,999	51.46	0	0.00
	Aug 06	15	6	90	21	0.23	5	0.06	742	8.24	1,111	12.34
	Aug 10	15	6	90	17	0.19	5	0.06	550	6.11	1,946	21.62
	Aug 13	16	6	96	4	0.04	1	0.01	276	2.88	4,192	43.67
	Aug 16	17	9	153	6	0.04	0	0.00	105	0.69	2,239	14.63
	Aug 20	18	6	108	0	0.00	0	0.00	12	0.11	2,548	23.59
	Aug 27	17	6	102	1	0.01	3	0.03	3	0.03	1,780	17.45
Total		22	65	1,051	1,621		2,457		22,085		13,816	
1991	Jul 01	17	6	102	483	4.74	1,200	11.76	3,043	29.83	0	0.0
	Jul 06	16	6	96	341	3.55	613	6.39	2,381	24.80	0	0.0
	Jul 13	18	6	108	112	1.04	981	9.08	4,384	40.59	0	0.00
	Jul 18	17	6	102	49	0.48	365	3.58	6,534	64.06	0	0.00
	Jul 22	19	6	114	28	0.25	117	1.03	7,154	62.75	17	0.15
	Jul 25	17	8	136	20	0.15	177	1.30	7,686	56.51	115	0.85
	Jul 29	16	8	128	21	0.16	70	0.55	3,452	26.97	177	1.38
	Aug 05	17	8	136	6	0.04	0	0.00	1,245	9.15	1,596	11.74
	Aug 08	17	8	136	4	0.03	3	0.02	835	6.14	2,381	17.51
	Aug 12	16	8	128	2	0.02	0	0.00	340	2.66	1,829	14.29
	Aug 14	15	8	120	4	0.03	0	0.00	227	1.89	2,461	20.51
	Aug 19	19	6	114	2	0.02	0	0.00	138	1.21	1,689	14.82
	Aug 26	16	8	128	0	0.00	0	0.00	49	0.38	4,425	34.57
Total		23	92	1,548	1,072		3,526		37,468		14,690	
1992	Jun 25	16	8	128	1,021	7.98	930	7.27	3,916	30.59	0	0.00
	Jun 29	15	6	90	815	9.06	525	5.83	2,439	27.10	0	0.00
	Jul 6	9	8	72	310	4.31	486	6.75	2,840	39.44	0	0.00
	Aug 03	17	8	136	27	0.20	317	2.33	1,440	10.59	5,106	37.54
	Aug 06	17	6	102	11	0.11	1	0.01	536	5.25	3,832	37.57
	Aug 11	19	6	114	7	0.06	1	0.01	136	1.19	3,837	33.66
	Aug 14	21	6	126	0	0.00	1	0.01	70	0.56	8,216	65.21
	Aug 17	16	6	96	0	0.00	0	0.00	24	0.25	5,685	59.22
	Aug 20	14	6	84	1	0.01	0	0.00	43	0.51	2,682	31.93
	Aug 24	14	6	84	3	0.04	1	0.01	17	0.20	2,827	33.65
	Aug 27	11	6	66	0	0.00	0	0.00	5	0.08	1,238	18.76
	Aug 31	11	6	66	0	0.00	0	0.00	1	0.02	1,153	17.47
Total		22	78	1,164	2,195		2,262		11,467		34,576	
1993	Aug 06	15	8	120	9	0.08	2	0.02	303	2.53	6,828	56.90
	Aug 09	17	6	102	4	0.04	1	0.01	153	1.50	3,839	37.64
	Aug 14	17	6	102	3	0.03	1	0.01	70	0.69	2,681	26.28
	Aug 17	16	6	96	3	0.03	0	0.00	23	0.24	2,349	24.47
	Aug 21	17	6	102	0	0.00	0	0.00	26	0.25	3,115	30.54
	Aug 25	15	6	90	0	0.00	1	0.01	24	0.27	3,008	33.42
	Aug 28	14	6	84	1	0.01	0	0.00	11	0.13	1,798	21.40
	Sept 01	13	6	78	1	0.01	0	0.00	9	0.12	791	10.14
Total		20	50	774	21		5		619		24,409	

-continued-

## Appendix B.19. (page 4 of 4)

Year	Date	Number of	Hours	Permit	Chinook		Sockeye		Chum		Coho	
		Permits	Fished	Hours	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1994	Aug 04	14	6	84	6	0.07	0	0.00	808	9.62	4,040	48.10
	Aug 09	17	6	102	3	0.03	0	0.00	350	3.43	5,790	56.76
	Aug 12	17	8	136	0	0.00	0	0.00	226	1.66	10,539	77.49
	Aug 15	16	8	128	0	0.00	1	0.01	151	1.18	7,190	56.17
	Aug 18	15	8	120	1	0.01	0	0.00	106	0.88	2,710	22.58
	Aug 22	12	8	96	0	0.00	1	0.01	34	0.35	1,855	19.32
	Aug 25	7	8	56	0	0.00	0	0.00	12	0.21	1,492	26.64
	Aug 27	6	6	36	0	0.00	1	0.03	2	0.06	677	18.81
Total		20	58	758	10		3		1,689		34,293	
1995	Jun 26	16	4	64	1,656	25.88	535	8.36	3,628	56.69	0	0.00
	Jun 29	13	4	52	707	13.60	620	11.92	3,577	68.79	0	0.00
	Jul 03	9	4	36	284	7.89	456	12.67	2,200	61.11	0	0.00
	Jul 06	8	4	32	74	2.31	331	10.34	2,372	74.13	0	0.00
	Jul 10	6	4	24	32	1.33	293	12.21	1,874	78.08	0	0.00
	Jul 14	2	4	8	7	0.88	51	6.38	480	60.00	0	0.00
	Jul 18	6	6	36	9	0.25	44	1.22	1,638	45.50	6	0.17
	Jul 21	5	4	20	4	0.20	132	6.60	899	44.95	13	0.65
	Aug 04	6	6	36	10	0.28	4	0.11	484	13.44	1,321	36.69
	Aug 08	9	6	54	2	0.04	6	0.11	379	7.02	2,816	52.15
	Aug 12	8	6	48	5	0.10	1	0.02	79	1.65	2,643	55.06
	Aug 16	12	6	72	1	0.01	0	0.00	41	0.57	4,398	61.08
	Aug 19	5	6	30	1	0.03	0	0.00	4	0.13	1,679	55.97
	Aug 22	8	6	48	0	0.00	1	0.02	9	0.19	1,750	36.46
	Aug 26	3	6	18	0	0.00	0	0.00	0	0.00	712	39.56
	Aug 29	3	6	18	0	0.00	0	0.00	4	0.22	660	36.67
	Sept 01	1	6	6	0	0.00	0	0.00	0	0.00	194	32.33
Total		21	88	602	2,792		2,474		17,668		16,192	
Year	Date	Permits	Fished	Hours	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1996	Jun 24	6	2	12	145	12.08	69	5.75	613	51.08	0	0.00
	Jul 2	4	2	8	175	21.88	109	13.63	376	47.00	0	0.00
	Jul 5	3	2	6	8	1.33	38	6.33	606	101.00	0	0.00
	Jul 8	4	4	16	42	2.63	92	5.75	877	54.81	0	0.00
	Jul 12	4	4	16	60	3.75	56	3.50	758	47.38	0	0.00
	Jul 16	1	4	4	5	1.25	33	8.25	336	84.00	3	0.75
	Jul 19	3	4	12	9	0.75	9	0.75	444	37.00	51	4.25
	Jul 22	2	6	12	0	0.00	6	0.50	414	34.50	234	19.50
	Jul 25	3	8	24	2	0.08	5	0.21	367	15.29	700	29.17
	Jul 29	2	6	12	1	0.08	2	0.17	98	8.17	668	55.67
	Jul 31	1	6	6	0	0.00	2	0.33	148	24.67	162	27.00
	Aug 10	2	6	12	0	0.00	0	0.00	0	0.00	787	65.58
	Aug 13	5	6	30	0	0.00	1	0.03	5	0.17	1,761	58.70
	Aug 16	2	6	12	0	0.00	0	0.00	8	0.67	590	49.17
	Aug 20	3	6	18	0	0.00	52	2.89	0	0.00	1,063	59.06
	Aug 23	2	6	12	0	0.00	0	0.00	0	0.00	620	51.67
	Aug 26	5	6	30	0	0.00	0	0.00	0	0.00	541	18.03
Total		8	84	242	447		474		5,050		7,180	
1997	Aug 12	2	6	12	1	0.08	0	0.00	23	1.92	494	41.17
	Aug 18	3	6	18	4	0.22	1	0.06	0	0.00	708	39.33
Total		4	12	30	5		1		23		1,202	
1998	Aug 06	3	6	18	3	0.17	0	0	111	6.17	313	17.39
	Aug 11	No harvest/ No deliveries										
Total		3	6	18	3		0		111		313	

<sup>a</sup> Gillnet mesh size unrestricted.<sup>b</sup> Gillnets were restricted to 6 inches or less; after 1985 this restriction was in effect for all periods.

Appendix B.20. Historical commercial salmon harvest by statistical area in District 1.

Year	Stat Area 335-11				Stat Area 335-12				Stat Area 335-13				Stat Area 335-14			
	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho
1984 <sup>ab</sup>	20,229	45,276	385,178	332,679	9,717	1,295	10,853	272,419								
1985 <sup>c</sup>	18,210	53,548	117,152	168,465	17,949	50,805	74,056	161,483								
1986	9,329	46,505	169,958	301,093	9,181	46,670	134,243	342,096								
1987	20,492	82,403	332,002	226,252	13,415	52,228	234,497	159,069								
1988 <sup>d</sup>	40,355	60,168	861,433	290,872	12,540	27,127	453,012	199,036	915	2,469	47,537	18,509				
1989	29,702	28,319	498,490	233,182	10,856	11,499	203,120	192,796	1,187	1,570	25,782	35,056				
1990 <sup>e</sup>	6,195	8,988	54,431	63,804	29,195	38,113	224,148	196,827	11,762	20,508	101,711	93,928	4,731	14,349	57,737	40,678
1991	4,218	16,961	63,636	98,565	23,104	50,760	165,651	217,820	5,840	19,884	92,063	117,335	3,544	17,815	72,984	52,525
1992	7,754	18,253	76,215	124,583	23,177	36,938	178,693	271,900	9,064	22,829	43,979	159,189	4,682	11,936	34,249	75,922
1993	2,198	10,054	12,272	113,956	6,302	16,821	26,712	226,119	148	116	1,912	171,208	66	12	1,822	75,047
1994	1,589	8,071	27,823	87,428	13,678	34,512	163,087	283,129	634	4,863	55,284	226,100	300	1,916	23,232	93,739
1995	4,917	19,129	111,404	63,421	12,966	27,055	257,166	175,531	8,336	29,131	153,619	164,763	1,835	14,711	66,061	51,554
1996	237	1,851	9,651	100,608	4,161	15,969	117,496	393,330	2,064	12,619	57,533	323,751	510	2,965	18,147	112,442
1997	2,257	8,072	5,279	18,232	8,063	13,845	11,010	61,671	95	59	255	26,795	21	12	459	22,903
1998	2,457	13,536	34,648	32,025	9,346	24,882	105,751	69,654	4,713	18,773	48,908	60,664	840	3,715	18,391	47,825

<sup>a</sup> Prior to June 25, gillnet mesh size was unrestricted in both statistical areas; after June 25, gillnet mesh size was restricted to 6 inches or less. Commercial fishing during chum season was allowed only in 335-11, both statistical areas were open during coho season.

<sup>b</sup> Through 1987, statistical area 335-11 was located downstream of Bethel, and 335-12 was located upstream from Bethel to Mishevak Slough.

<sup>c</sup> Since 1985, gillnets have been restricted to 6 inches or less during all commercial periods.

<sup>d</sup> The upstream boundary of District 1 was moved upstream to Bogus Creek; the area from the old boundary to Bogus Creek was designated as statistical area 335-13.

<sup>e</sup> Beginning in 1990, the upstream boundary of District 1 was moved downstream to Nelson Island and the district was split into four statistical areas. Statistical areas 335-11 & -12 are below Bethel, and 335-13 & -14 are above Bethel.

Appendix B.21. Estimated historical daily fish passage at George River weir.

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
6/09		2			0			0			0			0			401	
6/10		0			0			0			0			0			260	
6/11		2			0			0			0			0			221	
6/12		1			0			0			0			0			145	
6/13		0			0			0			0			0			366	
6/14		6			0			0			0			0			326	
6/15		26			0			0			0			0			430	
6/16		0			0			1			0			0			262	
6/17		11			0			2			0			0			68	
6/18		8			0			0			0			0			223	
6/19		42			0			2			0			0			100	
6/20		0			0			0			0			0			0	
6/21	27	17		0	0		65	0		0	0		0	0		519	276	
6/22	17	18	1	0	0	0	613	3	1	0	0	0	0	0	0	832	70	2
6/23	269	362	3	0	38	0	1,314	35	0	0	0	0	0	0	0	703	204	46
6/24	762	488	4	0	53	0	692	52	6	0	0	0	0	0	0	238	72	218
6/25	214	907	14	0	0	0	49	41	23	0	0	0	0	0	0	285	120	106
6/26	41	288	44	5	0	0	376	49	162	0	0	0	0	0	0	62	162	688
6/27	183	514	35	2	21	0	508	79	116	0	0	0	0	0	0	296	285	921
6/28	98	397	170	1	18	0	167	34	289	0	0	0	0	0	0	2	366	987
6/29	91	566	126	3	39	0	191	178	288	0	0	0	0	0	0	1	336	877
6/30	84	767	164	4	86	0	215	204	399	0	0	0	0	0	0	0	245	1,102
7/01	1,034	456	288	1	35	0	498	64	634	0	0	0	0	0	0	1	491	472
7/02	712	277	397	10	15	0	730	85	388	1	0	0	0	0	0	15	215	115
7/03	389	584	428	18	10	1	961	267	557	1	0	0	0	0	0	29	405	330
7/04	320	347	287	8	11	2	1,074	83	605	0	0	0	0	0	0	0	305	119
7/05	280	221	245	6	8	2	326	174	960	2	0	0	0	0	0	25	205	195
7/06	579	294	203	9	9	0	606	111	439	1	0	0	0	0	0	43	176	101
7/07	180	93	33	3	0	0	575	52	123	0	0	0	0	0	0	19	73	16
7/08	122	34		0	3		629	49		0	0		0	0		2	301	
7/09	436	37		15	1		852	40		12	0		0	0		149	4	
7/10	127	29		0	5		241	62		0	0		0	0		2	79	
7/11	376	33		0	1		446	45		0	0		0	0		6	6	
7/12	53	245		4	25		343	237		4	1		0	0		1	109	
7/13	60	31		2	0		394	7		9	0		0	0		3	24	
7/14	127	11		0	1		489	12		11	0		0	0		0	31	
7/15	324	65		0	0		556	158		34	1		0	0		21	2	
7/16	78	6		1	0		232	51		18	0		1	0		15	0	
7/17	67	22		0	6		462	236		34	0		0	0		15	39	
7/18	107	42		0	3		514	207		44	2		0	0		15	1	
7/19	63	87		3	2		667	575		90	1		1	0		0	10	
7/20	49	111		0	4		322	300		68	0		3	2		8	420	
7/21	58	83		0	2		387	342		61	0		0	1		146	76	
7/22	26	49		0	1		273	144		45	1		0	2		102	25	
7/23	29	32		2	0		321	292		39	2		6	0		0	72	
7/24	54	7		0	2		525	207		68	0		22	2		0	5	
7/25	34	41		2	1		449	238		74	1		47	2		0	21	
7/26	17	18		0	0		508	110		28	0		93	1		0	0	
7/27		9			0			42			0			2			0	
7/28		25			1			176			1			3			6	
7/29		7			7			96			0			2			4	
7/30		13	18		0	0		71	546		0	1		3	7		6	8
7/31		13	14		1	3		133	367		1	1		8	8		17	4

- continued -

## Appendix B.21. (page 2 of 2)

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
8/01		4	6		0	0		41	295		1	295		9	14		2	270
8/02		5	25		0	1		28	193		0	193		22	23		0	55
8/03		7			0			35			0			25			0	
8/04		4			1			70			0			52			1	
8/05		4			2			50			0			41			0	
8/06		2			3			38			0			59			0	
8/07		3			1			32			0			75			0	
8/08		3			1			33			1			69			0	
8/09		5			4			13			1			70			0	
8/10		1			0			17			1			35			0	
8/11		3			0			25			0			71			0	
8/12		8			3			34			0			198			0	
8/13		5			6			39			0			170			0	
8/14		2			4			32			0			213			0	
8/15		4			0			9			0			92			0	
8/16		8			0			12			0			44			0	
8/17		1			0			8			0			59			0	
8/18		1			0			5			0			103			0	
8/19		0			1			6			0			70			0	
8/20		3			1			7			0			346			0	
8/21		2			0			6			0			334			0	
8/22		1			0			0			0			1,152			0	
8/23		0			0			0			0			131			0	
8/24		0			1			0			0			162			0	
8/25		0			1			2			0			66			0	
8/26		0			2			5			0			275			1	
8/27		0			0			5			0			64			13	
8/28		0			0			1			0			60			6	
8/29		0			2			4			0			17			1	
8/30		0			3			6			2			1,474			21	
8/31		0			0			9			0			275			2	
9/01		0			0			1			0			481			0	
9/02		0			0			0			0			202			0	
9/03		0			0			4			0			161			7	
9/04		0			0			0			0			151			0	
9/05		0			0			4			0			261			0	
9/06		0			0			1			0			58			0	
9/07		0			0			7			0			234			0	
9/08		0			0			0			0			34			0	
9/09		0			0			0			0			375			0	
9/10		0			0			5			0			478			0	
9/11		0			0			0			0			174			0	
9/12		0			0			0			0			47			0	
9/13		0			0			0			0			141			1	
9/14		0			0			0			0			105			0	
9/15		0			0			0			0			174			0	
Total	7,487	7,820	2,505	98	445	9	17,570	5,940	6,391	644	17	490	173	8,937	52	3,555	8,121	6,632

\* estimated fish passage

Appendix B.22. Estimated historical daily cumulative fish passage at George River weir.

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
6/09		2			0			0			0			0			401	
6/10		2			0			0			0			0			661	
6/11		4			0			0			0			0			882	
6/12		5			0			0			0			0			1,027	
6/13		5			0			0			0			0			1,393	
6/14		11			0			0			0			0			1,719	
6/15		37			0			0			0			0			2,149	
6/16		37			0			1			0			0			2,411	
6/17		48			0			3			0			0			2,479	
6/18		56			0			3			0			0			2,702	
6/19		98			0			5			0			0			2,802	
6/20		98			0			5			0			0			2,802	
6/21	27	115		0	0		65	5		0	0		0	0		519	3,078	
6/22	44	133	1	0	0	0	678	8	1	0	0	0	0	0	0	1,351	3,148	2
6/23	313	495	4	0	38	0	1,992	43	1	0	0	0	0	0	0	2,054	3,352	48
6/24	1,075	983	8	0	91	0	2,684	95	7	0	0	0	0	0	0	2,292	3,424	266
6/25	1,289	1,890	22	0	91	0	2,733	136	30	0	0	0	0	0	0	2,577	3,544	372
6/26	1,330	2,178	66	5	91	0	3,109	185	192	0	0	0	0	0	0	2,639	3,706	1,060
6/27	1,513	2,692	101	7	112	0	3,617	264	308	0	0	0	0	0	0	2,935	3,991	1,981
6/28	1,611	3,089	271	8	130	0	3,784	298	597	0	0	0	0	0	0	2,937	4,357	2,968
6/29	1,702	3,655	397	11	169	0	3,975	476	885	0	0	0	0	0	0	2,938	4,693	3,847
6/30	1,786	4,422	561	15	255	0	4,190	680	1,284	0	0	0	0	0	0	2,938	4,938	4,949
7/01	2,820	4,878	849	16	290	0	4,688	744	1,918	0	0	0	0	0	0	2,939	5,429	5,421
7/02	3,532	5,155	1,246	25	305	0	5,418	829	2,306	1	0	0	0	0	0	2,954	5,644	5,536
7/03	3,921	5,739	1,674	43	315	1	6,379	1,096	2,863	2	0	0	0	0	0	2,983	6,049	5,866
7/04	4,241	6,086	1,961	51	326	3	7,453	1,179	3,468	2	0	0	0	0	0	2,983	6,354	5,985
7/05	4,521	6,307	2,206	57	334	5	7,779	1,353	4,428	4	0	0	0	0	0	3,008	6,559	6,180
7/06	5,100	6,601	2,409	66	343	5	8,385	1,464	4,867	5	0	0	0	0	0	3,051	6,735	6,281
7/07	5,280	6,694	2,442	69	343	5	8,960	1,516	4,990	5	0	0	0	0	0	3,070	6,808	6,297
7/08	5,402	6,728		69	346		9,589	1,565		5	0		0	0		3,072	7,109	
7/09	5,838	6,765		84	347		10,441	1,605		17	0		0	0		3,221	7,113	
7/10	5,965	6,794		84	352		10,682	1,667		17	0		0	0		3,223	7,192	
7/11	6,341	6,827		84	353		11,128	1,712		17	0		0	0		3,229	7,198	
7/12	6,394	7,072		88	378		11,471	1,949		21	1		0	0		3,230	7,307	
7/13	6,454	7,103		90	378		11,865	1,956		30	1		0	0		3,233	7,331	
7/14	6,581	7,114		90	379		12,354	1,968		41	1		0	0		3,233	7,362	
7/15	6,905	7,179		90	379		12,910	2,126		75	2		0	0		3,254	7,364	
7/16	6,983	7,185		91	379		13,142	2,177		93	2		1	0		3,269	7,364	
7/17	7,050	7,207		91	385		13,604	2,413		127	2		1	0		3,284	7,403	
7/18	7,157	7,249		91	388		14,118	2,620		171	4		1	0		3,299	7,404	
7/19	7,220	7,336		94	390		14,785	3,195		261	5		2	0		3,299	7,414	
7/20	7,269	7,447		94	394		15,107	3,495		329	5		5	2		3,307	7,834	
7/21	7,327	7,530		94	396		15,494	3,837		390	5		5	3		3,453	7,910	
7/22	7,353	7,579		94	397		15,767	3,981		435	6		5	5		3,555	7,935	
7/23	7,382	7,611		96	397		16,088	4,273		474	8		11	5		3,555	8,007	
7/24	7,436	7,618		96	399		16,613	4,480		542	8		33	7		3,555	8,012	
7/25	7,470	7,659		98	400		17,062	4,718		616	9		80	9		3,555	8,033	
7/26	7,487	7,677		98	400		17,570	4,828		644	9		173	10		3,555	8,033	
7/27		7,686			400			4,870			9			12			8,033	
7/28		7,711			401			5,046			10			15			8,039	
7/29		7,718			408			5,142			10			17			8,043	
7/30		7,731	2,460		408	5		5,213	5,536		10	1		20	7		8,049	6,305
7/31		7,744	2,474		409	8		5,346	5,903		11	2		28	15		8,066	6,309

- continued -

## Appendix B.22. (page 2 of 2)

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
8/01		7,748	2,480	409	8		5,387	6,198		12	297		37	29		8,068	6,579	
8/02		7,753	2,505	409	9		5,415	6,391		12	300		59	52		8,068	6,634	
8/03		7,760		409			5,450			12			84			8,068		
8/04		7,764		410			5,520			12			136			8,069		
8/05		7,768		412			5,570			12			177			8,069		
8/06		7,770		415			5,608			12			236			8,069		
8/07		7,773		416			5,640			12			311			8,069		
8/08		7,776		417			5,673			13			380			8,069		
8/09		7,781		421			5,686			14			450			8,069		
8/10		7,782		421			5,703			15			485			8,069		
8/11		7,785		421			5,728			15			556			8,069		
8/12		7,793		424			5,762			15			754			8,069		
8/13		7,798		430			5,801			15			924			8,069		
8/14		7,800		434			5,833			15			1,137			8,069		
8/15		7,804		434			5,842			15			1,229			8,069		
8/16		7,812		434			5,854			15			1,273			8,069		
8/17		7,813		434			5,862			15			1,332			8,069		
8/18		7,814		434			5,867			15			1,435			8,069		
8/19		7,814		435			5,873			15			1,505			8,069		
8/20		7,817		436			5,880			15			1,851			8,069		
8/21		7,819		436			5,886			15			2,185			8,069		
8/22		7,820		436			5,886			15			3,337			8,069		
8/23		7,820		436			5,886			15			3,468			8,069		
8/24		7,820		437			5,886			15			3,630			8,069		
8/25		7,820		438			5,888			15			3,696			8,069		
8/26		7,820		440			5,893			15			3,971			8,070		
8/27		7,820		440			5,898			15			4,035			8,083		
8/28		7,820		440			5,899			15			4,095			8,089		
8/29		7,820		442			5,903			15			4,112			8,090		
8/30		7,820		445			5,909			17			5,586			8,111		
8/31		7,820		445			5,918			17			5,861			8,113		
9/01		7,820		445			5,919			17			6,342			8,113		
9/02		7,820		445			5,919			17			6,544			8,113		
9/03		7,820		445			5,923			17			6,705			8,120		
9/04		7,820		445			5,923			17			6,856			8,120		
9/05		7,820		445			5,927			17			7,117			8,120		
9/06		7,820		445			5,928			17			7,175			8,120		
9/07		7,820		445			5,935			17			7,409			8,120		
9/08		7,820		445			5,935			17			7,443			8,120		
9/09		7,820		445			5,935			17			7,818			8,120		
9/10		7,820		445			5,940			17			8,296			8,120		
9/11		7,820		445			5,940			17			8,470			8,120		
9/12		7,820		445			5,940			17			8,517			8,120		
9/13		7,820		445			5,940			17			8,658			8,121		
9/14		7,820		445			5,940			17			8,763			8,121		
9/15		7,820		445			5,940			17			8,937			8,121		



Appendix B.23. Estimated historical daily cumulative percent fish passage at George River weir.<sup>a</sup>

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
6/09		0			0			0			0			0			5	
6/10		0			0			0			0			0			8	
6/11		0			0			0			0			0			11	
6/12		0			0			0			0			0			13	
6/13		0			0			0			0			0			17	
6/14		0			0			0			0			0			21	
6/15		0			0			0			0			0			26	
6/16		0			0			0			0			0			30	
6/17		1			0			0			0			0			31	
6/18		1			0			0			0			0			33	
6/19		1			0			0			0			0			34	
6/20		1			0			0			0			0			34	
6/21	0	1		0	0		0	0		0	0		0	0		15	38	
6/22	1	2		0	0		4	0		0	0		0	0		38	39	
6/23	4	6		0	9		11	1		0	0		0	0		58	41	
6/24	14	13		0	20		15	2		0	0		0	0		64	42	
6/25	17	24		0	20		16	2		0	0		0	0		72	44	
6/26	18	28		5	20		18	3		0	0		0	0		74	46	
6/27	20	34		7	25		21	4		0	0		0	0		83	49	
6/28	22	40		8	29		22	5		0	0		0	0		83	54	
6/29	23	47		11	38		23	8		0	0		0	0		83	58	
6/30	24	57		15	57		24	11		0	0		0	0		83	61	
7/01	38	62		16	65		27	13		0	0		0	0		83	67	
7/02	47	66		26	69		31	14		0	0		0	0		83	69	
7/03	52	73		44	71		36	18		0	0		0	0		84	74	
7/04	57	78		52	73		42	20		0	0		0	0		84	78	
7/05	60	81		58	75		44	23		1	0		0	0		85	81	
7/06	68	84		67	77		48	25		1	0		0	0		86	83	
7/07	71	86		70	77		51	26		1	0		0	0		86	84	
7/08	72	86		70	78		55	26		1	0		0	0		86	88	
7/09	78	87		86	78		59	27		3	0		0	0		91	88	
7/10	80	87		86	79		61	28		3	0		0	0		91	89	
7/11	85	87		86	79		63	29		3	0		0	0		91	89	
7/12	85	90		90	85		65	33		3	6		0	0		91	90	
7/13	86	91		92	85		68	33		5	6		0	0		91	90	
7/14	88	91		92	85		70	33		6	6		0	0		91	91	
7/15	92	92		92	85		73	36		12	12		0	0		92	91	
7/16	93	92		93	85		75	37		14	12		1	0		92	91	
7/17	94	92		93	87		77	41		20	12		1	0		92	91	
7/18	96	93		93	87		80	44		27	24		1	0		93	91	
7/19	96	94		96	88		84	54		41	29		1	0		93	91	
7/20	97	95		96	89		86	59		51	29		3	0		93	96	
7/21	98	96		96	89		88	65		61	29		3	0		97	97	
7/22	98	97		96	89		90	67		68	35		3	0		100	98	
7/23	99	97		98	89		92	72		74	47		6	0		100	99	
7/24	99	97		98	90		95	75		84	47		19	0		100	99	
7/25	100	98		100	90		97	79		96	53		46	0		100	99	
7/26	100	98		100	90		100	81		100	53		100	0		100	99	
7/27		98			90			82			53			0			99	
7/28		99			90			85			59			0			99	
7/29		99			92			87			59			0			99	
7/30		99			92			88			59			0			99	
7/31		99			92			90			65			0			99	

- continued -

## Appendix B.23. (page 2 of 2)

Date	Chinook			Sockeye			Chum			Pink			Coho			Suckers		
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998
8/01		99			92			91			71			0			99	
8/02		99			92			91			71			1			99	
8/03		99			92			92			71			1			99	
8/04		99			92			93			71			2			99	
8/05		99			93			94			71			2			99	
8/06		99			93			94			71			3			99	
8/07		99			93			95			71			3			99	
8/08		99			94			96			76			4			99	
8/09		100			95			96			82			5			99	
8/10		100			95			96			88			5			99	
8/11		100			95			96			88			6			99	
8/12		100			95			97			88			8			99	
8/13		100			97			98			88			10			99	
8/14		100			98			98			88			13			99	
8/15		100			98			98			88			14			99	
8/16		100			98			99			88			14			99	
8/17		100			98			99			88			15			99	
8/18		100			98			99			88			16			99	
8/19		100			98			99			88			17			99	
8/20		100			98			99			88			21			99	
8/21		100			98			99			88			24			99	
8/22		100			98			99			88			37			99	
8/23		100			98			99			88			39			99	
8/24		100			98			99			88			41			99	
8/25		100			98			99			88			41			99	
3/26		100			99			99			88			44			99	
8/27		100			99			99			88			45			100	
8/28		100			99			99			88			46			100	
8/29		100			99			99			88			46			100	
8/30		100			100			99			100			63			100	
8/31		100			100			100			100			66			100	
9/01		100			100			100			100			71			100	
9/02		100			100			100			100			73			100	
9/03		100			100			100			100			75			100	
9/04		100			100			100			100			77			100	
9/05		100			100			100			100			80			100	
9/06		100			100			100			100			80			100	
9/07		100			100			100			100			83			100	
9/08		4/9			4/9			100			4/9			83			4/8	
9/09		4/9			4/9			100			4/9			87			4/8	
9/10		4/9			4/9			4/9			4/9			93			4/8	
9/11		4/9			4/9			4/9			4/9			95			4/8	
9/12		4/9			4/9			4/9			4/9			95			4/8	
9/13		4/9			4/9			4/9			4/9			97			4/9	
9/14		4/9			4/9			4/9			4/9			98			4/9	
9/15		4/9			4/9			4/9			4/9			100			4/9	

<sup>a</sup> The boxed areas within each column represent the central 50 percent test-fish catches and the median; years without boxed areas or numbers had truncated operational periods which disallowed estimating run timing.

Appendix B.24. Estimated historical salmon passage at Takotna River tower.

Date	Chinook Passage												Chum Passage												
	Daily				Cumulative				Percent				Daily				Cumulative				Percent				
	1995	1996	1997	1998	1995	1996	1997	1998	1995	1996	1997	1998	1995	1996	1997	1998	1995	1996	1997	1998	1995	1996	1997	1998	
6/15	0	0			0	0			0	0			0	0			0	0			0	0			
6/16	0	0			0	0			0	0			0	0			0	0			0	0			
6/17	0	0			0	0			0	0			0	0			0	0			0	0			
6/18	0	0			0	0			0	0			0	0			0	0			0	0			
6/19	0	0			0	0			0	0			0	0			0	0			0	0			
6/20	0	0	0		0	0	0		0	0			0	0	0		0	0	0		0	0			
6/21	0	0	0		0	0	0		0	0			14	6	0		14	6	0		0	0			
6/22	0	6	0		0	6	0		0	1			0	0	0		14	6	0		0	0			
6/23	0	0	0		0	6	0		0	1			0	0	0		14	6	0		0	0			
6/24	0	12	0		0	18	0		0	2			102	12	0		116	18	0		4	1			
6/25	0	30	0		0	48	0		0	4			0	27	0		116	45	0		4	3			
6/26	9	24	0		9	72	0		2	6			0	12	0		116	57	0		4	3			
6/27	17	9	0		26	81	0		6	7			137	51	0		253	108	0		9	6			
6/28	8	33	0		34	114	0		8	10			58	45	0		311	153	0		11	9			
6/29	21	36	0		55	150	0		14	13			127	84	0		438	237	0		16	13			
6/30	18	57	0		73	207	0		18	18			117	48	9		555	285	9		20	16			
7/01	15	0	0		88	207	0		22	18			101	18	0		656	303	9		23	17			
7/02	12	30	3		100	237	3		25	20			85	33	15		741	336	24		26	19			
7/03	12	72	3		112	309	6		28	26			89	33	6		830	369	30		30	21			
7/04	73	66	3		185	375	9		46	32			123	69	3		953	438	33		34	25			
7/05	39	54	12		224	429	21		56	37			264	72	12		1,217	510	45		43	29			
7/06	10	54			234	483			58	41			295	87			1,512	597			54	33			
7/07	37	33			271	516			67	44			0	242	33		0	1,754	630			63	35		
7/08	24	54			295	570			73	49			53	209	42		53	1,963	672			70	38		
7/09	3	69			298	639			74	55			18	172	57		71	2,135	729			76	41		
7/10	4	51			302	690			75	59			222	105	63		293	2,240	792			80	4		
7/11	5	69			307	759			76	65			63	88	60		356	2,328	852			83	41		
7/12	5	48			312	807			78	69			42	78	33		398	2,406	885			86	50		
7/13	7	24			319	831			79	71			98	70	36		496	2,476	921			88	52		
7/14	7	66			326	897			81	77			117	11	117		613	2,487	1,038			89	58		
7/15	9	27			335	924			83	79			82	28	36		695	2,515	1,074			90	60		
7/16	0	12			335	936			83	80			126	37	54		821	2,552	1,128			91	63		
7/17	20	36			355	972			88	83			11	58	78		832	2,610	1,206			93	68		
7/18	11	48			366	1,020			91	87			150	53	57		982	2,663	1,263			95	71		
7/19	9	12			375	1,032			93	88			189	35	18		1,171	2,698	1,281			96	72		
7/20	8	15			383	1,047			95	90			42	29	30		1,213	2,727	1,311			97	73		
7/21	7	3			390	1,050			97	90			129	26	72		1,342	2,753	1,383			98	77		
7/22	5	12			395	1,062			98	91			72	21	24		1,414	2,774	1,407			99	79		
7/23	4	9			399	1,071			99	92			79	15	66		1,493	2,789	1,473			99	83		
7/24	3	18			402	1,089			100	93			8	6	57		1,501	2,795	1,530			100	86		
7/25	0	15			402	1,104			100	95			18	11	24		1,519	2,806	1,554			100	87		
7/26	0	18			402	1,122			100	96			11	0	15		1,530	2,806	1,569			100	88		
7/27		12				1,134				97			33		72		1,563		1,641				92		
7/28		6				1,140				98			21		21		1,584		1,662				93		
7/29		15				1,155				99			29		57		1,613		1,719				96		
7/30		0				1,155				99			66		27		1,679		1,746				98		
7/31		0				1,155				99			6		21		1,685		1,767				99		
8/01		3				1,158				99					12				1,779				100		
8/02		6				1,164				100					6				1,785				100		
8/03		3				1,167				100					0				1,785				100		
8/04		0				1,167				100					0				1,785				100		

<sup>a</sup> The boxed areas within each column represent the central 50 percent test-fish catches and the median; years without boxed areas or number had truncated operational periods which disallowed estimating run timing.

Appendix B.25. Daily salmon passage at Tatlawiksuk River weir in 1998.

Date	Chinook		Sockeye		Chum		Pink		Suckers	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/18	0	0	0	0	0	0	0	0	67	67
6/19	0	0	0	0	0	0	0	0	151	218
6/20	1	1	0	0	0	0	0	0	43	261
6/21	0	1	0	0	5	5	0	0	24	285
6/22	0	1	0	0	4	9	0	0	23	308
6/23	8	9	0	0	12	21	0	0	327	635
6/24	12	21	0	0	25	46	0	0	108	743
6/25	7	28	0	0	26	72	0	0	215	958
6/26	12	40	0	0	65	137	0	0	290	1,248
6/27	37	77	0	0	197	334	0	0	517	1,765
6/28	31	108	0	0	275	609	0	0	359	2,124
6/29	23	131	0	0	195	804	0	0	245	2,369
6/30	5	136	0	0	146	950	0	0	133	2,502
7/01	99	235	0	0	464	1,414	0	0	61	2,563
7/02	182	417	0	0	529	1,943	0	0	130	2,693
7/03	171	588	0	0	556	2,499	0	0	215	2,908
7/04	224	812	0	0	1,005	3,504	0	0	155	3,063
7/05	74	886	0	0	1,011	4,515	0	0	127	3,190
7/06	62	948	0	0	757	5,272	0	0	55	3,245
7/07	22	970	0	0	454	5,726	0	0	1	3,246

Appendix B.26. Kuskokwim River, District W-1, commercial catch and CPUE<sup>a</sup> comparisons

Date	Chinook				Sockeye				Chum				Coho			
	catch		CPUE		catch		CPUE		catch		CPUE		catch		CPUE	
	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>	1998	Avg <sup>b</sup>
6/24	6,413	9,727	3.2	2.9	9,043	21,521	4.5	6.5	32,467	52,840	16.0	17.5	----	----	----	----
6/29	6,358	6,759	2.5	1.8	22,506	21,848	8.8	5.5	66,789	100,383	26.1	25.7	----	----	----	----
7/03	2,277	2,756	1.3	1.0	15,985	14,857	9.0	5.8	51,471	69,293	28.9	27.8	----	----	----	----
7/11	1,127	2,760	0.7	1.0	10,172	15,282	6.1	5.9	29,407	57,093	17.6	24.0	----	----	----	----
7/22	460	310	0.2	0.1	1,538	1,191	0.7	0.5	15,663	32,623	7.5	12.0	3,633	15,972	1.8	6.0
7/27	----	----	----	----	----	----	----	----	7,500	14,735	3.4	4.4	18,497	22,174	8.3	6.7
8/01	----	----	----	----	----	----	----	----	2,787	4,751	1.1	1.4	26,791	44,518	10.5	15.2
8/06	----	----	----	----	----	----	----	----	1,020	2,045	0.3	0.5	45,128	71,569	15.2	18.8
8/11	----	----	----	----	----	----	----	----	388	806	0.1	0.2	58,426	91,273	21.0	24.1
8/17	----	----	----	----	----	----	----	----	----	----	----	----	34,640	58,025	13.2	15.6
8/22	----	----	----	----	----	----	----	----	----	----	----	----	18,936	36,916	8.3	11.6
8/29	----	----	----	----	----	----	----	----	----	----	----	----	4,093	12,554	4.4	6.2

a Catch Per Unit Effort - number of fish caught per fishermen per hour in period

b Average for time period 1981-1987 for years with a commercial period on that day or on the day before or after that date

Appendix B.27. Factor table for historical estimates, Kogrukluk River 1976-1998

Year	Chinook				Sockeye				Coho <sup>a</sup>				Chum			
	T <sup>b</sup>	Count	Prop. Missed	Est'd Total	T <sup>b</sup>	Count	Prop. Missed	Est'd Total	T <sup>b</sup>	Count	Prop. Missed	Est'd Total	T <sup>b</sup>	Count	Prop. Missed	Est'd Total
1976	L	5,500	0.0142	5,579	N	2,302	0.0103	2,326					N	8,046	0.0087	8,117
1977	(N)	763	0.6077	1,945	(N)	732	0.5527	1,637					(N)	7,404	0.6192	19,443
1978	N	13,102	0.0413	13,667	N	1,646	0.0144	1,670					N	47,099	0.0213	48,125
1979	N	10,104	0.1088	11,338	N	2,432	0.0746	2,638					L	13,959	0.2495	18,599
1980		676	c	6,572		403	c	3,200						5,638	c	41,777
1981	E	16,052	0.0362	16,655	E	17,691	0.0208	18,066	N	11,450	0.0004	11,455	E	56,262	0.0192	57,365
1982	E	5,325	0.5156	10,993	E	11,729	0.3219	17,297	N	35,582	0.0586	37,796	N	40,549	0.3672	64,077
1983	(N)	1,032	0.6551	2,992	(N)	375	0.6812	1,176	L	8,327	0.0247	8,538	(N)	3,248	0.6547	9,407
1984	N	4,928	0.0000	4,928	N	4,133	0.0000	4,133	E	25,304	0.0830	27,595	N	41,484	0.0000	41,484
1985	L	4,034	0.0682	4,619	L	4,344	0.0034	4,359	E	14,318	0.1291	16,441	L	13,851	0.0769	15,005
1986	L	2,922	0.4200	5,038	N	3,252	0.2301	4,224	E	14,717	0.3461	22,506	N	11,980	0.1846	14,693
1987		d		4,063		d		973	N	19,756	0.1343	22,821		d		17,422
1988	N	7,677	0.0974	8,505	E	4,235	0.0368	4,397	N	11,722	0.1325	13,512	E	28,498	0.2793	39,540
1989	N	4,908	0.5889	11,940	N	2,599	0.5527	5,811				e	N	15,543	0.6070	39,540
1990	N	10,097	0.0118	10,218	N	8,382	0.0029	8,406	L	2,736	0.5538	6,132	N	26,555	0.0078	26,765
1991	N	6,132	0.2189	7,850	N	14,450	0.1218	16,455	L	7,059	0.2915	6,132	L	21,331	0.1181	24,188
1992	N	6,397	0.053	6,755	L	7,328	0.0210	7,540	(N)	2,715	0.8958	26,057	N	32,051	0.0602	34,105
1993	N	10,516	0.1473	12,332	N	27,219	0.0729	29,358	(N)	4,437	0.7837	20,517	N	26,926	0.1559	31,899
1994	(E)	8,310	0.4543	15,227	L	5,676	0.6001	14,192	(E)	27,461	0.2085	34,695	(E)	23,756	0.4490	46,635
1995	E	18,856	0.0860	20,630	N	10,581	0.0377	10,996	E	17,492	0.3721	27,861	N	28,292	0.0923	31,265
1996	E	13,734	0.0327	14,199	N	15,221	0.0107	15,385	E	47,011	0.0701	50,555	E	47,010	0.0306	48,495
1997	E	13,112	0.0131	13,286	N	13,059	0.0014	13,078	L	11,611	0.0511	12,237	L	7,902	0.0071	7,958
1998		f				f				22,615	0.0710	24,344		f		

a Coho migrations were not monitored prior to 1981

b The timing model used for estimating missed counts depends on the distribution of the mean date of migration (E-early, N-normal, L- late). The use of ( ) indicates assumed timing.

c From Baxter (1980); insufficient data to estimate escapements using time series techniques.

d Except for coho, escapements were estimated from a ratio of unknown 1987 escapement and known 1987 aerial assessments to known 1988 escapement and known 1988 aerial assessment. Coho escapements estimated using time series techniques.

e Heavy rain and high river levels allowed only two days of counts during the coho migration.

f A combination of high water caused late installation and rain induced high water levels did not allow a sufficient portion of the run to be enumerated to develop a total season escapement estimate for king, sockeye, and chum salmon in 1998.

Date	1976(L)	1978(N)	1979(N)	1981(E)	1984(N)	1985(L)	1986(L)	1988(N)	1990(N)	1991(N)	1992(N)	1993(N)	1994(E)	1995(E)	1996(E)	1997(E)	1998(L)
19-Jun					1												
20-Jun					0												
21-Jun					0												
22-Jun					0												
23-Jun					2												
24-Jun					1	0											
25-Jun					2	1											
26-Jun					1												
27-Jun					4												
28-Jun				334	57				6								51
29-Jun	0	112		533	87		0		23								610
30-Jun	5	65		562	45		3		119						80		596
01-Jul	16	342		617	315		25		49						264		507
02-Jul	2	118	156	904	304		97		463		255		423		998		172
03-Jul	18	485	107	879	254		67		361		387	606	268	313	831		927
04-Jul	15	804	258	740	139		91		179		163		458	2,024	397		587
05-Jul	70	629	371	1,001	97		61	349	427		235		1,130	1,462	1,464	1,025	
06-Jul	43	345	382	1,080	238		51	465	453		74	708	1,110	1,779	1,688	790	
07-Jul	66	253	309	1,215	174	60	60	696	255		145	876	937	1,306	1,788	1,142	145
08-Jul	157	619	390	773	144	106	130	583	842	204	138	715	692	1,133	880	486	
09-Jul	312	884	343	1,047	165	119	77	571	151	622	817	880	1,245	679	683	708	
10-Jul	461	671	619	983	23	416	482	684	1,228	517	325	1,004	775	1,826	552	219	
11-Jul	347	701	462	749	104	166	282	704	528	281	431	683		797	339	224	
12-Jul	274	632	760	526	285	245	109	658	1,001	441	485	653		1,714	418	532	
13-Jul	716	597	932	491	262	305	457	492	111	688	138	688		764	715	303	
14-Jul	312	613	982	458	324	269	281	595	387	517	305	426		375	515	552	
15-Jul	251	673	548	560	331	146	304	450	1,055	320	408	367		246	282	398	
16-Jul	247	727	700	452	276	328	135	311	647		165	409		774	181	324	
17-Jul	287	652	670	379	225	175	194	150	218	515	326	334		689	237	377	
18-Jul	424	488	464	322	105	299		103	408	378	280	411	598	373	227	477	
19-Jul	283	561	355	298	99	259		124	60	328	195	162		475	260	357	329
20-Jul	94	475	334	243	137	177		47	97	291	144	272		274	88	392	264
21-Jul	392	271	345	187	124	151		107	197	158	167	200		266	180	346	215
22-Jul	190	302	178	183	111	72		108	101	169	165	59		362	98	208	98
23-Jul	171	203	131	118	89	104		84	128	46	159	101		151	56	110	112
24-Jul	82	299	308	78	69	170		56	57		103	88		134	77	53	205
25-Jul	87	180		42	36	116		46	37	45	84	52		220	99	34	127
26-Jul	56	114		41	44	130		38	55	39	33	76		159	31	100	184
27-Jul	50	92		31	30	68		27	35	30	26	77		135	25	13	194
28-Jul	20	72		36	37	78		16	44	38	27	121		67	27	81	114
29-Jul	28	64		31	32	55		27	70	34	30		141	67	52	37	110
30-Jul	24	59		24	26	28		31	47	12	20		108	76	99	47	101
31-Jul					22	33		23	56	18	21	19	86	27	19	36	64
01-Aug					16	35			45	11	17	14	58	24		20	58
02-Aug					22	35			42	25	25	7	27	25		30	31
03-Aug					18	24		4	29	16	10	16	25	47	9	25	25
04-Aug					12	7		12	11	8		25		21	7	13	30
05-Aug					4	14		6	14	3		23		11	2	18	17
06-Aug					3	14		7	11	5		20		10	6	19	14
07-Aug					4	2		6	6	5		29	16	4	8	13	20
08-Aug					8	18		10	9	0		21	19	15	10	10	15
09-Aug					3	8		3	7	0		11	2	10	2	23	5
10-Aug					1	19		1	2	1	7	15	6		14	28	10
11-Aug					3	13		5	10	3	7	5				33	3
12-Aug					1	12		10	4	1	7	11	6				7
13-Aug					5	5		2	2	2	8	6	5				5
14-Aug					1	6		3	1	2	1		9			4	5
15-Aug					1	1		2	3	0	5		7		5	13	5
16-Aug					1	0		3	2	1	9		4	1	1	6	3
17-Aug					1	0		5	0	2	2		3	3	0	5	2
18-Aug					0	0		4	1	0	4		0	2	1	1	7
19-Aug					2	0		3	1	1	2		5	0	0	5	4
20-Aug					0	0		3	0	1	1		1	2	3	4	4
21-Aug					1	0	2	3	1	0	0		3	3	2	1	1
22-Aug						0	7	3	0	1			1	1	3	2	0
23-Aug						0	4	2	1	0			0	1	4	1	1
24-Aug						0	1	0	0	0			0	0	1	0	1
25-Aug						0	0	1	0	1			0	0	0	2	3
26-Aug						0	0	1	0	1			0	0	2	4	1
27-Aug						0	1	1	0	0			0	3	1	4	0
28-Aug						0	1	4	0	0			0	2	1	0	0
29-Aug						0	0	1	0	0			6	4	2	7	3

Total

5,500 13,102 10,104 15,917 4,928 4,287 2,922 7,650 10,097 5,781 6,356 10,190 8,221 18,856 13,734 13,112 2,542

Run-timing indicated by letters next to year as follows: L = late; N = normal; E = early.C33

ESCAPEMENT GOAL = 10,000+C33



Date	1976(N)	1978(N)	1981(E)	1982(E)	1984(N)	1985(L)	1988(E)	1990(N)	1991(N)	1992(L)	1993(N)	1995(N)	1996(N)	1997(N)	1998(L)
20-Jun						0									
21-Jun						1									
22-Jun						0									
23-Jun						0									
24-Jun						3									
25-Jun						2									
26-Jun						1									
27-Jun						2									
28-Jun			0	222		3		0							
29-Jun	1	0	540		10			0						8	
30-Jun	0	1	705		12			5					10	83	
01-Jul	1	11	974		7			6					75	30	
02-Jul	4	36	1,252		85			77		88			257	104	
03-Jul	7	55	940		124			155		181	120	31	385	91	
04-Jul	2	72	624		57			107		131		236	243	319	
05-Jul	17	58	798		51		75	271		105		383	452	291	
06-Jul	27	66	841		281	9	150	460		77	648	537	536	537	
07-Jul	66	31	595		178	19	283	301		133	1,126	458	806	574	13
08-Jul	133	101	636		214	50	476	634	132	61	1,371	430	646	577	
09-Jul	204	105	702	2,025	159	76	505	204	757	145	2,157	501	1,105	549	
10-Jul	207	143	435	1,750	24	91	419	827	759	125	2,517	708	945	261	
11-Jul	120	116	647	748	62	129	507	437	372	355	1,899	806	954	330	
12-Jul	138	55	492	830	295	221	365	617	589	266	1,796	337	908	377	
13-Jul	230	72	421	821	173	234	239	116	1,036	225	1,818	395	1,539	428	
14-Jul	112	126	384	575	339	145	273	522	987	394	1,502	212	1,122	421	
15-Jul	101	67	469	302	438	178	276	737	742	416	1,822	362	821	668	
16-Jul	143	63	595	686	219	208	179	463		406	2,028	621	458	826	
17-Jul	102	74	421	781	192	185	109	409	814	239	2,040	694	368	443	
18-Jul	147	48	430	371	84	173	83	429	928	466	1,711	369	299	955	138
19-Jul	79	45	386	443	63	259	46	90	948	418	832	494	385	851	405
20-Jul	52	51	386	630	121	176	37	157	929	272	945	263	209	876	462
21-Jul	166	24	595	315	169	207	40	183	754	245	779	493	370	611	469
22-Jul	95	49	526	140	188	127	29	193	759	138	220	472	268	566	441
23-Jul	43	40	365	149	89	115	33	137	617	318	286	258	233	274	244
24-Jul	33	41	345	187	83	227	28	73		261	202	216	251	511	164
25-Jul	34	32	297	185	38	242	9	57	586	242	191	232	308	152	449
26-Jul	5	15	257	141	60	160	9	83	495	152	214	137	67	129	334
27-Jul	7	8	287	123	50	164	4	21	422	245	230	258	117	193	452
28-Jul	9	15	242	89	57	194	10	73	256	236	182	92	99	161	424
29-Jul	3	11	189	86	32	157	6	171	181	282		103	236	182	258
30-Jul	8	8	141	77	18	131	9	81	128	212		151	244	127	228
31-Jul	6	7	110	67	14	93	12	60	136	149	87	56	81	89	189
01-Aug			80	56	32	108		59	104	100	51	42	71	89	130
02-Aug			67	26	25	57		64	83	152	29	70	61	62	99
03-Aug			65	29	23	43	1	45	48	62	19	54	51	54	96
04-Aug			41	23	20	41	3	17	36		16	38	32	37	77
05-Aug			18	17	8	27	3	28	24		16	19	38	38	74
06-Aug			27	12	2	27	2	12	14		20	9	47	41	19
07-Aug			13	8	3	11	1	14	10		24	8	31	16	25
08-Aug			15	9	3	27	0	13	3		17	17	23	26	18
09-Aug			23	6	3	8	1	5	3		14	10	9	15	23
10-Aug			20	5	1	7	3	1	4	6	2		31	14	17
11-Aug			8	5	6	1	1	4	6	4	2			20	16
12-Aug			12	3	3	13	1	6	9	7	6			32	6
13-Aug			10	0	0	2	1	4	4	6	4				6
14-Aug			10	4	1	1	1	3	0	4					11
15-Aug			5	4	1	1	0	2	1	0			7	4	6
16-Aug			6	1	0	0	0	0	1	0		0	1	5	6
17-Aug			7	0	0	0	0	3	1	4		1	2	2	1
18-Aug			1		0	0	2	0	4	0		1	5	4	3
19-Aug			2		1	0	1	0	0	0		2	0	1	3
20-Aug			2		0	0	0	0	1	0		1	1	1	1
21-Aug			0		1	0	1	0	0	1		1	0	0	2
22-Aug			2		0	0	1	0	0			0	2	0	0
23-Aug			0		0	0	0	0	0			0	4	1	4
24-Aug			3		0	0	0	0	1			0	1	0	0
25-Aug			0		1	0	0	0	0			0	1	0	1
26-Aug			1		1	0	0	0	2			0	2	0	1
27-Aug			1		0	0	1	0	0			0	0	1	1
28-Aug			1		0	0	0	0	0			0	0	1	1
29-Aug			2		0	0	0	0	1			3	4	1	0
Total	2,302	1,646	17,691	11,729	4,133	4,344	4,235	8,382	13,687	7,329	26,943	10,581	15,221	13,059	5,317

Run-timing indicated by letters next to year as follows: L = late; N = normal; E = early.

ESCAPEMENT GOAL = 2,000

Appendix B.30 Historical daily actual escapement of chum salmon at the Kogrukiuk River weir for years with similar data compared to 1998.

Date	1976(N)	1978(N)	1981(E)	1982(N)	1984(N)	1985(L)	1988(E)	1990(N)	1991(L)	1992(N)	1993(N)	1995(N)	1996(E)	1997(L)	1998 (L)
19-Jun						2									
20-Jun						0									
21-Jun						0									
22-Jun						9									
23-Jun						3									
24-Jun						13									
25-Jun						39									
26-Jun						42									
27-Jun						43									
28-Jun		308	1,203			38									
29-Jun	26	618	2,264		222									216	
30-Jun	49	629	2,255		275							205		157	
01-Jul	118	648	2,650		417							1,134		156	
02-Jul	81	1,032	3,516		939			746		2,416		3,055		165	
03-Jul	130	1,695	3,607		1,154			1,037		2,615	844	913	2,834	251	
04-Jul	189	1,679	2,107		1,371			1,439		1,915	1,066	1,583	2,212	245	
05-Jul	182	1,954	1,936		841		1,845	1,783	357	1,695	1,000	2,050	3,537	499	
06-Jul	339	2,151	2,873		1,616	261	1,380	1,592		1,011	1,314	1,134	2,868	346	
07-Jul	523	1,403	2,246		1,896	685	1,694	801		1,207	1,418	2,149	2,686	389	836
08-Jul	613	2,156	1,900	2,873	1,950	381	1,959	1,741	245	914	1,244	1,399	3,699	362	
09-Jul	679	2,296	2,892	4,469	1,964	618	2,751	1,089	780	1,169	1,417	766	1,277	157	
10-Jul	510	2,802	3,513	3,396	1,092	542	2,151	1,987	549	719	1,436	1,196	2,470	192	
11-Jul	365	2,969	2,888	2,999	1,301	382	2,638	1,414	517	1,261	1,251	1,146	1,511	210	
12-Jul	421	2,350	2,031	2,581	2,766	499	2,635	993	1,159	1,250	1,082		1,754	272	
13-Jul	336	2,172	1,869	2,961	2,077	539	1,960	728	1,436	944	1,390	1,531	3,064	334	
14-Jul	322	3,351	2,287	2,442	2,323	707	2,078	872	1,018	1,343	1,006	1,151	2,054	329	
15-Jul	323	2,502	2,456	1,945	2,512	557	1,772	1,553	1,001	1,466	1,405	867	1,366	391	
16-Jul	341	2,580	1,930	2,421	2,271	836	997	1,223	980	1,254	1,511	1,007	1,391	304	
17-Jul	265	1,881	1,180	3,018	1,907	724	727	664	959	907	2,030	1,770	1,601	247	
18-Jul	333	1,522	1,300	2,563	1,336	646	410	1,117	1,040	1,262	1,785	1,023	1,033	313	592
19-Jul	282	1,381	928	1,919	969	628	459	203	742	1,071	524	1,188	864	320	1,175
20-Jul	240	1,311	429	1,710	1,420	511	335	403	467	812	1,017	553	628	174	1,522
21-Jul	591	645	724	1,414	1,688	472	344	607	462	484	1,242	1,023	1,139	263	1,492
22-Jul	253	975	686	904	1,652	473	230	441	788	518	500	933	569	128	1,101
23-Jul	166	766	531	916	1,205	449	193	316	813	910	487	1,015	814	163	822
24-Jul	173	879	501	747	712	525	228	76	858	553	336	727	483	71	585
25-Jul	74	815	265	638	390	575	95	99	903	680	490	542	265	55	722
26-Jul	32	563	348	547	417	459	124	95	940	398	266	334	182	123	513
27-Jul	33	390	378	476	457	316	103	95	767	467	377	306	117	100	670
28-Jul	12	239	492	393	325	341	119	162	648	374	489	249	355	192	710
29-Jul	24	215	383	384	320	242	97	362	496	299	451	285	597	123	507
30-Jul	14	110	362	440	268	217	147	324	612	277	414	329	415	77	359
31-Jul	7	112	284	273	318	259	134	281	852	254	307	216	190	36	290
01-Aug			209	230	280	149	113	348	754	164	205	171		48	153
02-Aug			183	187	217	149	92	423	594	240	127	206		50	141
03-Aug			146	172	159	91	71	298	487	183	109	209	131	56	130
04-Aug			78	91	133	87	72	235	319	104	127	104	99	38	192
05-Aug			35	104	50	58	61	157	283	65	104	59	53	33	145
06-Aug			55	32	20	52	62	78	213	49	150	42	82	42	92
07-Aug			43	37	13	52	55	75	92	97	114	47	51	32	51
08-Aug			43	22	8	77	53	41	58	59	79	44	50	21	42
09-Aug			41	38	9	45	45	49	36	29	43	37	24	28	25
10-Aug			47	19	11	82	47	46	49	60	15	32	60	27	23
11-Aug			29	16	11	54	35	42	15	69	10			68	19
12-Aug			25	16	9	30	37	39	37	70	15				10
13-Aug			27	15	0	38	18	18	28	82	26				8
14-Aug			24	6	1	19	16	23	20	25				7	11
15-Aug			23	2	1	16	7	12	8	25			16	11	11
16-Aug			6	2	0		13	6	7	17		5	5	15	3
17-Aug			5	4	1		20	11	34	16		2	2	5	11
18-Aug			4		1		20	1	35	9		3	5	2	3
19-Aug			2		0		15	4	12	1		7	6	2	4
20-Aug			9		0		12	3	0	4		3	4	4	4
21-Aug			5				12	2	5	13		1	8	1	1
22-Aug			0				5	0	0			3	5	0	3
23-Aug			1				9	0	0			0	6	0	1
24-Aug			3				1	1	1			6	1	0	3
25-Aug			2				0	1	3			0	7	1	1
26-Aug			1				0	0	1			2	3	0	5
27-Aug			2				1	1	0			1	2	0	2
28-Aug			0				0	0	0			1	1	2	5
29-Aug			0				1	1	1			9	20	5	1
Total	8,046	47,099	56,237	43,422	41,484	13,843	28,442	26,145	22,458	31,808	29,223	28,346	46,947	7,843	13,023

Run-timing indicated by letters next to year as follows: L = late; N = normal; E = early.

ESCAPEMENT GOAL = 30,000

Appendix B.31 Historical daily actual escapement of coho salmon at the Kogrukluk River weir for years with similar data compared to 1998.

Date	1981(N)	1982(N)	1983(L)	1984(E)	1985(E)	1987(N)	1988(N)	1991(L)	1994(E)	1995(E)	1996(E)	1997(L)	1998(L)
20-Jul	0	0		0	0		1	0		3	1	0	0
21-Jul	0	0		0	0		0	0		0	2	0	0
22-Jul	0	0		0	0		0	0		1	3	0	0
23-Jul	0	0		0	0		0	0		1	0	0	0
24-Jul	0	0		1	0		1	0		1	2	0	0
25-Jul	0	0		4	0		0	0		2	6	0	0
26-Jul	0	0		2	0		0	0		1	3	0	0
27-Jul	0	0		1	0		0	0		0	3	0	0
28-Jul	0	0		1	0		0	0	12	2	15	0	0
29-Jul	0	0		4	0		0	0	22	0	25	2	0
30-Jul	0	0		2	0		0	0	29	1	83	0	1
31-Jul	0	0		3	0		0	0	23	0	26	1	2
01-Aug	0	0		11	6		0	0	51	1		4	2
02-Aug	0	5		14	4		0	0	30	1		5	3
03-Aug	0	6		19	7		0	1	50	2	110	3	10
04-Aug	2	15		32	7		0	1		2	41	4	7
05-Aug	5	17		18	14		0	9		1	36	23	14
06-Aug	5	16		53	8		4	3		0	215	22	6
07-Aug	2	42		99	18		6	5	86	1	151	47	7
08-Aug	10	36		44	49		11	2	123	2	140	11	5
09-Aug	26	55		119	13	3	15	1	103	7	245	26	17
10-Aug	20	42		52	94	8	25	5	108		606	65	6
11-Aug	22	106		222	59	18	38	13				89	27
12-Aug	62	91		115	118	29	80	34	215				17
13-Aug	62	58	18	224	68	35	86	25	209				35
14-Aug	133	78	35	147	82	39	46	15				21	127
15-Aug	154	195	56	179	84	61	25	8	439		1,123	64	91
16-Aug	141	56	18	144		86	105	52	416		1,384	123	244
17-Aug	109	511	26	86		140	157	185	581	80	1,473	84	225
18-Aug	110	465	46	1,258		243	258	201	837	327	1,107	93	54
19-Aug	296	371	24	995		199	202	163	761	521	1,035	117	24
20-Aug	314	283	11	537		298	290	106	829	669	2,142	238	128
21-Aug	187	409	3	321		412	352	74	597	855	2,510	449	747
22-Aug	185	142	67	1,412		286	383	49	469	818	2,547	428	298
23-Aug	197	228	152	1,730		318	323	111	439	931	2,665	479	260
24-Aug	255	647	100	1,190	321	527	389	16	841	902	2,418	425	940
25-Aug	416	868	35	2,031	231	658	258	435	2,096	1,002	2,727	611	470
26-Aug	318	804	6	2,036	200	776	898	128	2,943	1,116	2,346	585	1,331
27-Aug	369	946	27	731	473	762	378	118	2,713	1,198	1,953	401	438
28-Aug	267	820	270	584	890	814	618	34	1,887	1,962	2,430	350	481
29-Aug	144	632	49	370	817	1,151	553	24	1,007	1,263	1,375	300	590
30-Aug	302	1,488	28	688	494	1,141	770	5	396	1,785	2,056	707	903
31-Aug	322	1,680	161	907	859	1,824	494	11	842	1,166	2,098	908	1,441
01-Sep	296	1,537	580	613	1,380	1,008	330	4	1,947		2,004	564	1,405
02-Sep	328	1,905	27	821	1,271	1,773	369	259	1,400		1,948	251	1,574
03-Sep	296	1,980	469	713	566	1,160	238	947	1,155	749	1,492	431	1,395
04-Sep	612	1,285	363	853	557	2,950	237	463	643	903	990	69	1,982
05-Sep	535	1,781	100	787	631	1,053	171	312	630	630	890	540	1,189
06-Sep	655	5,013	556	742	530	962	170	359	425	586	907	234	642
07-Sep	506	3,219	205	343	853		153	470	384		1,035	722	242
08-Sep	521	2,165	111	1,107	818		445	472	527		775	597	483
09-Sep	567	1,460	151	1,081	589		179	473	436		517	415	424
10-Sep	335	1,226	858	47	339		434	544	356		460	342	767
11-Sep	283	921	360	830	155		966	242			345	195	722
12-Sep	246	722	15	363	308		436	137			230	102	553
13-Sep	239	748	175	224	233		257	67			128	80	427
14-Sep	194	508	887	357	259		152	225			116	62	270
15-Sep	157		134	37	241	21	112	226			72	52	356
16-Sep	168		151		140	61	121					89	363
17-Sep	132		424		113	123	186					89	435
18-Sep	149		405		84	75							229
19-Sep	118		269		138	151						38	201
20-Sep	138		189		90	253						28	
21-Sep	103		125		60	110						26	
22-Sep	114		257		38	53							
23-Sep	78		114		9	175							
24-Sep	44		135										
25-Sep	30		47										
26-Sep	29		45										
27-Sep	26		43										
28-Sep	13												
29-Sep	14												
30-Sep	20												
01-Oct	19												
02-Oct	18												
03-Oct	15												
04-Oct	7												
05-Oct	10												
06-Oct													
Actual	11,450	35,582	8,327	25,304	14,318	19,756	11,722	7,034	27,057	17,492	47,011	11,611	22,610

Run-timing indicated by letters next to year as follows: L = late; N = normal; E = early.C33  
 ESCAPEMENT GOAL = 25,000

## **APPENDIX C**

Appendix C.1. Quinhagak District commercial effort 1970-1998.

YEAR	NUMBER OF PERIODS	FISHING HOURS <sup>a</sup>	EFFORT <sup>b</sup>
1970	14	1,494	88
1971	6	630	61
1972	16	192	107
1973	28	504	109
1974	30	360	196
1975	24	288	127
1976	27	324	181
1977	27	324	258
1978	37	444	200
1979	36	432	206
1980	36	432	169
1981	33	396	186
1982	34	408	117
1983	28	318	226
1984	33	396	263
1985	23	276	300
1986	29	348	324
1987	19	216	310
1988	32	384	288
1989	29	348	227
1990	30	444	390
1991	31	372	346
1992	34	420	349
1993	32	384	409
1994	32	384	308
1995	35	414	382
1996	27	298	218
1997	31	372	289
1998	34	408	203
Ten Year Average (1988-97)	31	382	321

a Number of hours that fishing was open in the Quinhagak District.

b Permits that made at least one delivery during the year.

Appendix C.2. Historical commercial effort by salmon species caught in Quinhagak District, 1975-1998.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1975	120	124	81	99	124	127
1976	169	145	90	167	176	181
1977	245	205	76	76	260	258
1978	195	101	77	140	197	200
1979b						206
1980	152	126	120	143	156	169
1981	187	176	142	56	190	186
1982b						177
1983	216	204	111	81	213	226
1984	238	229	227	209	238	263
1985	284	276	167	26	286	300
1986	320	307	148	201	315	324
1987	289	268	184	34	290	310
1988	253	186	182	167	236	288
1989	208	191	160	75	211	227
1990	377	371	138	259	386	390
1991	319	332	164	0	330	346
1992	329	340	189	280	341	349
1993	403	406	158	4	402	409
1994	288	278	136	238	289	308
1995	364	345	173	72	367	382
1996	202	212	137	1	210	218
1997	286	284	113	3	275	289
1998	199	199	117	76	196	203
Ten Year Average (88-97)	303	295	155	189a	305	321

a Average of even years only.

b Catch by permit unavailable.

Appendix C.3. Quinhagak District commercial salmon harvest, 1960-1998.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,551	160	53,334	142,861
1982	22,106	25,685	73,652	11,838	34,346	167,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,663	17,255	132,151	16,249	50,422	249,740
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,883	21,556	68,605	21,310	29,220	154,574
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
1994	8,564	72,314	83,912	35,904	61,301	261,995
1995	38,584	68,194	66,203	186	81,462	254,629
1996	14,165	57,665	118,718	20	83,005b	273,573
1997	35,510	69,562	32,862	5	38,445	176,384
1998	23,158	41,382	80,183	2,217	45,095	192,035
Ten Year Average (88 - 97)	20,163	58,907	62,663	26,701a	54,936	210,079

a Average of even years only

b Estimate of chum roe included



Appendix C.4. Kanektok River aerial surveys by species, 1962-1998<sup>a</sup>.

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	3,112	11,375		
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		22,936		8,697
1977	5,787	7,244		32,157
1978 <sup>b</sup>	19,180	44,215		229,290
1979				
1980				
1981 <sup>c</sup>	6,172	113,931	69,325	25,950
	15,900	49,175		71,840
1982 <sup>d</sup>	8,142	55,940		
1983	8,890	2,340		9,360
1984 <sup>e</sup>	12,182	30,840	46,830	53,060
1985	13,465	16,270		14,385
1986	3,643	14,940		16,790
1987	4,223	51,753	20,056	9,420
1988	11,180	30,440		20,583
1989	7,914	14,735		6,270
1990	2,563	32,082		2,475
1991 <sup>d</sup>	2,100	44,436	4,330	19,052
1992 <sup>f</sup>	3,856	14,955		25,675
1993	4,670	23,128		1,285
1994 <sup>g</sup>	7,386	30,090		10,000
1995				
1996 <sup>g</sup>	6,107	22,020	23,656	7,040
1997 <sup>h</sup>	8,080	27,100	5,192	3,270
1998				
10 YR AVG:	5,000	15,000		30,500
OBJECTIVE:				

<sup>a</sup> Aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; text are footnoted.

<sup>b</sup> Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

<sup>c</sup> Poor survey for chinook, sockeye, chum salmon.

<sup>d</sup> Late survey for chinook, sockeye salmon (after 5 August).

<sup>e</sup> Poor coho survey.

<sup>f</sup> Some chum may have been sockeye.

<sup>g</sup> Chum count not at peak, estimate made during chinook survey.

<sup>h</sup> Chinook, chum and sockeye numbers from 2 August. Chum not at peak. Coho survey on October 1, not at peak.

Appendix C.5. Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	1	0	0	0	0
6/13	5	33	7,720	6,669	0.0552
6/14	2	0	5,080	2,540	0.0670
6/15	5	1,165	3,914	2,948	0.0989
6/16	5	0	7,835	1,179	0.1346
6/17	2	3,527	8,190	5,859	0.1618
6/18	6	1,942	11,997	5,710	0.2451
6/19	3	3,525	6,405	5,801	0.2816
6/20	5	746	7,341	3,031	0.3247
6/21	4	4,268	6,194	4,976	0.3721
6/22	4	3,642	10,586	4,377	0.4254
6/23	4	2,039	11,652	4,807	0.4795
6/24	6	1,403	6,698	4,102	0.5371
6/25	6	2,125	4,539	3,435	0.5844
6/26	4	1,506	3,578	1,722	0.6042
6/27	3	1,849	9,711	3,795	0.6399
6/28	4	1,438	4,089	2,528	0.6644
6/29	5	0	2,378	1,919	0.6831
6/30	5	690	4,496	1,272	0.7067
7/01	4	657	3,752	2,211	0.7273
7/02	8	1,105	3,602	1,872	0.7627
7/03	6	1,096	2,771	1,903	0.7893
7/04	5	508	4,068	1,381	0.8114
7/05	7	611	2,710	967	0.8307
7/06	6	273	1,670	844	0.8429
7/07	8	620	1,566	1,135	0.8640
7/08	6	465	2,407	837	0.8801
7/09	7	441	1,259	739	0.8927
7/10	5	334	956	736	0.9007
7/11	9	331	1,545	621	0.9174
7/12	4	306	687	483	0.9220
7/13	8	205	1,011	494	0.9320
7/14	8	26	1,351	422	0.9414
7/15	7	230	1,306	352	0.9512
7/16	5	196	533	401	0.9553
7/17	7	130	443	222	0.9595
7/18	6	187	845	231	0.9644
7/19	5	97	792	140	0.9680
7/20	6	89	490	265	0.9718
7/21	7	90	248	162	0.9746
7/22	6	35	629	171	0.9776
7/23	6	0	324	97	0.9795
7/24	7	33	254	105	0.9815
7/25	6	0	379	110	0.9834
7/26	4	0	71	35	0.9837

-Continued-

## Appendix C.5. (Page 2 of 2)

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	10	0	194	91	0.9859
7/28	4	31	63	51	0.9864
7/29	8	21	116	81	0.9878
7/30	5	49	111	78	0.9887
7/31	8	0	63	38	0.9894
8/01	7	28	153	67	0.9906
8/02	6	14	53	37	0.9911
8/03	9	16	160	53	0.9923
8/04	4	0	59	34	0.9926
8/05	10	6	141	36	0.9937
8/06	7	19	78	38	0.9944
8/07	6	15	49	27	0.9948
8/08	8	0	71	19	0.9953
8/09	6	6	36	12	0.9955
8/10	8	0	125	38	0.9963
8/11	5	6	31	15	0.9965
8/12	8	12	74	21	0.9971
8/13	6	0	36	17	0.9973
8/14	8	6	29	14	0.9976
8/15	6	2	43	28	0.9979
8/16	8	1	16	8	0.9981
8/17	8	1	66	13	0.9984
8/18	7	7	13	10	0.9986
8/19	10	0	51	10	0.9989
8/20	6	6	16	9	0.9990
8/21	9	4	13	5	0.9992
8/22	6	3	33	9	0.9993
8/23	8	1	11	5	0.9994
8/24	7	1	14	4	0.9995
8/25	8	0	16	5	0.9996
8/26	9	1	17	5	0.9997
8/27	4	3	4	3	0.9997
8/28	8	2	8	4	0.9998
8/29	7	0	7	2	0.9999
8/30	3	0	9	1	0.9999
8/31	8	0	3	1	0.9999
9/01	6	0	10	1	0.9999
9/02	8	0	4	1	1.0000
9/03	5	0	2	0	1.0000
9/04	6	0	4	2	1.0000
9/05	7	0	2	1	1.0000
9/06	5	0	1	0	1.0000
9/07	8	0	0	0	1.0000
9/08	3	0	0	0	1.0000
9/09	1	0	0	0	1.0000

Appendix C.6. Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	1	0	0	0	0
6/13	5	4	216	55	0.0006
6/14	2	0	384	192	0.0011
6/15	5	62	440	99	0.0022
6/16	5	0	411	150	0.0034
6/17	2	356	1,119	738	0.0054
6/18	6	117	574	449	0.0086
6/19	3	171	1,678	741	0.0122
6/20	5	111	485	367	0.0143
6/21	4	1,039	2,322	1,739	0.0236
6/22	4	379	1,146	754	0.0277
6/23	4	343	1,741	1,497	0.0346
6/24	6	638	3,271	1,818	0.0514
6/25	6	732	3,043	1,654	0.0651
6/26	4	805	2,777	2,009	0.0754
6/27	3	461	4,923	543	0.0835
6/28	4	1,908	10,941	2,190	0.1069
6/29	5	0	6,304	3,940	0.1309
6/30	5	1,360	9,771	2,601	0.1626
7/01	4	975	8,625	5,005	0.1892
7/02	8	1,242	10,007	2,748	0.2318
7/03	6	2,244	7,045	3,580	0.2647
7/04	5	627	8,757	5,555	0.2944
7/05	7	1,157	15,375	2,934	0.3411
7/06	6	1,126	8,381	4,998	0.3813
7/07	8	1,211	8,326	3,978	0.4280
7/08	6	1,289	9,304	5,005	0.4704
7/09	7	1,532	9,824	6,806	0.5227
7/10	5	2,229	9,894	4,622	0.5595
7/11	9	1,901	7,672	5,800	0.6183
7/12	4	1,468	6,827	4,149	0.6408
7/13	8	1,842	13,450	4,974	0.7072
7/14	8	279	7,490	2,370	0.7398
7/15	7	1,240	6,687	4,505	0.7802
7/16	5	564	8,537	3,209	0.8031
7/17	7	937	5,203	3,609	0.8350
7/18	6	657	5,842	1,388	0.8526
7/19	5	866	12,850	2,391	0.8812
7/20	6	477	4,611	2,120	0.8994
7/21	7	477	2,523	989	0.9120
7/22	6	799	3,537	1,305	0.9251
7/23	6	0	4,361	538	0.9348
7/24	7	215	2,610	944	0.9452
7/25	6	0	2,681	684	0.9532
7/26	4	0	1,404	462	0.9563

-Continued-

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	10	0	2,096	476	0.9648
7/28	4	102	879	504	0.9675
7/29	8	126	997	438	0.9727
7/30	5	19	1,516	379	0.9761
7/31	8	1	730	218	0.9791
8/01	7	42	757	157	0.9816
8/02	6	38	583	116	0.9832
8/03	9	30	408	137	0.9853
8/04	4	3	442	240	0.9866
8/05	10	6	333	153	0.9886
8/06	7	16	321	143	0.9899
8/07	6	30	481	125	0.9914
8/08	8	0	198	68	0.9923
8/09	6	6	307	75	0.9931
8/10	8	10	112	29	0.9936
8/11	5	6	192	28	0.9940
8/12	8	1	125	57	0.9947
8/13	6	0	205	24	0.9952
8/14	8	1	194	31	0.9959
8/15	6	12	166	32	0.9963
8/16	8	0	133	28	0.9967
8/17	8	1	71	17	0.9970
8/18	7	6	146	27	0.9974
8/19	10	0	48	12	0.9976
8/20	6	3	97	31	0.9979
8/21	9	0	139	23	0.9983
8/22	6	1	75	12	0.9985
8/23	8	1	102	15	0.9989
8/24	7	0	18	2	0.9989
8/25	8	0	114	9	0.9992
8/26	9	0	33	5	0.9993
8/27	4	0	30	5	0.9994
8/28	8	0	68	6	0.9996
8/29	7	0	11	6	0.9997
8/30	3	0	58	0	0.9997
8/31	8	0	20	4	0.9998
9/01	6	0	32	3	0.9999
9/02	8	0	14	5	0.9999
9/03	4	0	8	1	0.9999
9/04	6	0	18	3	1.0000
9/05	7	0	16	0	1.0000
9/06	5	0	1	0	1.0000
9/07	8	0	5	0	1.0000
9/08	3	0	3	0	1.0000
9/09	1	0	0	0	1.0000

Appendix C.7. Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	1	0	0	0	0.0000
6/13	5	14	1,092	84	0.0018
6/14	2	0	2,125	1,063	0.0044
6/15	5	189	2,821	1,008	0.0110
6/16	5	0	847	279	0.0134
6/17	2	1,556	1,916	1,736	0.0176
6/18	6	290	2,611	1,623	0.0288
6/19	3	788	1,913	1,198	0.0336
6/20	5	287	2,760	746	0.0401
6/21	4	868	4,471	2,214	0.0521
6/22	4	1,051	6,984	1,854	0.0666
6/23	4	1,103	3,226	1,452	0.0754
6/24	6	732	5,990	2,316	0.0974
6/25	6	1,711	6,662	2,956	0.1244
6/26	4	1,199	4,329	2,190	0.1366
6/27	3	1,855	2,722	1,874	0.1445
6/28	4	2,458	5,449	3,951	0.1639
6/29	5	0	8,441	5,269	0.1966
6/30	5	2,066	4,903	2,501	0.2160
7/01	4	1,836	13,544	6,427	0.2507
7/02	8	1,972	6,034	3,424	0.2874
7/03	6	1,788	10,073	4,734	0.3259
7/04	5	2,333	3,155	2,839	0.3431
7/05	7	1,820	7,481	4,168	0.3810
7/06	6	2,192	8,484	4,584	0.4153
7/07	8	2,939	7,138	3,630	0.4553
7/08	6	3,050	8,296	4,472	0.4920
7/09	7	3,518	8,768	4,638	0.5382
7/10	5	4,022	5,667	5,221	0.5692
7/11	9	2,313	9,329	3,997	0.6199
7/12	4	3,211	9,074	3,803	0.6443
7/13	8	3,182	9,794	4,841	0.6986
7/14	8	134	5,381	2,025	0.7235
7/15	7	2,796	10,756	5,791	0.7754
7/16	5	1,784	3,369	2,193	0.7901
7/17	7	2,326	8,308	3,842	0.8283
7/18	6	1,310	4,343	2,806	0.8489
7/19	5	1,577	4,960	3,184	0.8687
7/20	6	1,590	4,684	2,806	0.8907
7/21	7	1,143	2,503	1,827	0.9062
7/22	6	990	2,696	1,740	0.9191
7/23	6	0	2,210	1,503	0.9293
7/24	7	499	2,713	1,406	0.9426
7/25	6	0	1,397	1,078	0.9496
7/26	4	0	1,446	941	0.9536

-Continued-

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	10	0	1,885	710	0.9625
7/28	4	333	975	571	0.9656
7/29	8	190	1,412	669	0.9725
7/30	5	173	802	551	0.9756
7/31	8	5	715	364	0.9794
8/01	7	246	479	334	0.9823
8/02	6	153	459	267	0.9844
8/03	9	110	580	247	0.9873
8/04	4	4	652	189	0.9886
8/05	10	98	357	196	0.9911
8/06	7	52	381	181	0.9928
8/07	6	43	260	108	0.9937
8/08	8	0	234	119	0.9947
8/09	6	11	265	105	0.9956
8/10	8	9	108	57	0.9961
8/11	5	4	110	37	0.9964
8/12	8	15	109	49	0.9969
8/13	6	2	100	36	0.9973
8/14	8	13	166	31	0.9979
8/15	6	6	106	36	0.9982
8/16	8	2	96	31	0.9985
8/17	8	0	50	15	0.9987
8/18	7	7	49	9	0.9989
8/19	10	0	54	12	0.9991
8/20	6	3	27	13	0.9992
8/21	9	2	26	11	0.9994
8/22	6	1	18	13	0.9995
8/23	8	3	27	12	0.9996
8/24	7	0	8	1	0.9996
8/25	8	0	25	5	0.9997
8/26	9	0	15	5	0.9998
8/27	4	0	6	2	0.9998
8/28	8	2	17	4	0.9998
8/29	7	0	3	0	0.9998
8/30	3	0	18	1	0.9999
8/31	8	0	10	1	0.9999
9/01	6	0	8	1	0.9999
9/02	8	0	7	1	0.9999
9/03	5	0	43	0	1.0000
9/04	6	0	13	0	1.0000
9/05	7	0	5	0	1.0000
9/06	5	0	0	0	1.0000
9/07	8	0	2	0	1.0000
9/08	3	0	0	0	1.0000
9/09	1	0	0	0	1.0000



Appendix C.8. Summary of historical commercial harvest by period, Quinhagak District, coho salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	1	0	0	0	0.0000
6/13	5	0	0	0	0.0000
6/14	2	0	0	0	0.0000
6/15	5	0	0	0	0.0000
6/16	5	0	0	0	0.0000
6/17	2	0	0	0	0.0000
6/18	6	0	0	0	0.0000
6/19	3	0	0	0	0.0000
6/20	5	0	0	0	0.0000
6/21	4	0	0	0	0.0000
6/22	4	0	0	0	0.0000
6/23	4	0	0	0	0.0000
6/24	6	0	0	0	0.0000
6/25	6	0	0	0	0.0000
6/26	4	0	0	0	0.0000
6/27	3	0	0	0	0.0000
6/28	4	0	0	0	0.0000
6/29	5	0	0	0	0.0000
6/30	5	0	2	0	0.0000
7/01	4	0	0	0	0.0000
7/02	8	0	1	0	0.0000
7/03	6	0	0	0	0.0000
7/04	5	0	0	0	0.0000
7/05	7	0	0	0	0.0000
7/06	6	0	0	0	0.0000
7/07	8	0	0	0	0.0000
7/08	6	0	0	0	0.0000
7/09	7	0	39	0	0.0000
7/10	5	0	5	0	0.0000
7/11	9	0	9	0	0.0001
7/12	4	0	2	0	0.0001
7/13	8	0	38	3	0.0001
7/14	8	0	2	0	0.0001
7/15	7	0	24	4	0.0002
7/16	5	0	39	4	0.0002
7/17	7	0	251	10	0.0005
7/18	6	1	234	11	0.0007
7/19	5	2	88	11	0.0009
7/20	6	3	787	59	0.0021
7/21	7	7	366	19	0.0026
7/22	6	1	250	27	0.0030
7/23	6	0	1,386	66	0.0047
7/24	7	21	2,295	93	0.0074
7/25	6	0	3,482	309	0.0115
7/26	4	0	122	99	0.0118

-Continued-

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	10	0	5,512	389	0.0227
7/28	4	71	1,214	342	0.0245
7/29	8	152	7,989	639	0.0354
7/30	5	335	3,079	738	0.0418
7/31	8	146	5,597	764	0.0508
8/01	7	389	5,680	910	0.0612
8/02	6	390	12,478	2,298	0.0808
8/03	9	592	5,390	1,294	0.0956
8/04	4	190	4,293	1,851	0.1028
8/05	10	387	19,091	3,045	0.1401
8/06	7	1,589	8,436	4,206	0.1665
8/07	6	693	8,188	4,929	0.1934
8/08	8	0	19,215	2,536	0.2333
8/09	6	1,831	11,553	5,486	0.2661
8/10	8	1,237	9,428	5,771	0.3074
8/11	5	4,686	10,076	6,800	0.3378
8/12	8	2,710	10,458	3,628	0.3751
8/13	6	1,561	10,961	5,725	0.4060
8/14	8	1,671	10,424	3,898	0.4413
8/15	6	1,603	15,733	7,852	0.4875
8/16	8	1,403	8,299	3,923	0.5178
8/17	8	2,008	9,897	5,584	0.5587
8/18	7	1,008	9,776	6,931	0.6013
8/19	10	0	12,931	4,526	0.6473
8/20	6	3,958	8,728	5,540	0.6779
8/21	9	2,110	9,161	3,662	0.7140
8/22	6	2,493	8,437	4,582	0.7386
8/23	8	2,400	11,957	4,528	0.7775
8/24	7	2,790	8,673	5,394	0.8096
8/25	8	115	5,308	2,807	0.8282
8/26	9	1,419	6,505	4,552	0.8603
8/27	4	1,431	5,975	3,687	0.8734
8/28	8	1,335	4,684	3,245	0.8952
8/29	7	0	3,623	2,701	0.9105
8/30	3	1,054	9,431	2,193	0.9217
8/31	8	1,427	7,145	2,668	0.9434
9/01	6	0	2,565	1,739	0.9520
9/02	8	535	5,148	1,454	0.9677
9/03	5	0	2,777	600	0.9731
9/04	6	0	4,442	1,484	0.9825
9/05	7	0	3,799	901	0.9895
9/06	5	0	1,769	0	0.9921
9/07	8	0	3,956	305	0.9989
9/08	3	0	1,262	0	1.0000
9/09	1	0	0	0	1.0000

## **APPENDIX D**

Appendix D.1. Goodnews Bay District commercial effort 1970-1998.

YEAR	NUMBER OF PERIODS	FISHING HOURS <sup>a</sup>	EFFORT <sup>b</sup>
1970	28	624	35
1971	3	156	16
1972	8	186	14
1973	24	288	21
1974	30	360	49
1975	24	288	50
1976	32	384	40
1977	24	288	34
1978	36	432	35
1979	36	432	30
1980	38	456	48
1981	34	492	48
1982	34	540	48
1983	28	336	79
1984	31	372	77
1985	22	264	69
1986	30	360	86
1987	21	252	69
1988	30	360	125
1989	28	336	88
1990	28	396	82
1991	27	432	72
1992	26	396	111
1993	28	336	114
1994	32	432	116
1995	25	396	118
1996	21	247	53
1997	23	276	54
1998	29	348	50
Ten Year Average (1988-97)	27	361	93

a Number of hours that fishing was open in the Goodnews Bay District.

b Permits that made at least one delivery during the year.

Appendix D.2. Historical commercial effort by salmon species caught in Goodnews District, 1975-1998.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1975	37	41	35	31	41	41
1976	39	41	31	39	41	42
1977	29	34	30	13	31	35
1978	29	30	30	30	29	34
1979b						30
1980	37	39	40	37	35	41
1981	43	44	44	1	41	44
1982	45	44	45	44	43	47
1983	71	68	40	0	70	72
1984	67	63	71	66	66	77
1985	63	63	52	6	63	69
1986	70	85	64	79	81	86
1987b						69
1988	106	123	76	87	100	125
1989	63	82	83	41	66	88
1990	71	82	42	41	81	82
1991	57	67	52	0	62	72
1992	85	111	53	104	106	111
1993	102	113	56	0	110	114
1994	106	116	44	105	115	116
1995	100	118	49	24	108	118
1996	46	53	32	1	53	53
1997	52	54	27	0	52	54
1998	49	50	33	26	50	50
Ten Year Average (88-97)	79	92	51	68a	85	93

a Average of even years only.

b Catch by permit unavailable.

Appendix D.3. Goodnews Bay District commercial salmon harvest, 1968-1998.

<u>YEAR</u>	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>TOTAL</u>
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0	10,657	92,081
1994	2,570	69,490	47,499	18,017	28,477	166,053
1995	2,922	37,351	17,875	39	19,832	78,019
1996	1,375	30,717	43,836	22	11,093	87,043
1997	2,039	31,451	2,983	0	11,729	48,202
1998	3,675	27,161	21,246	411	14,155	66,648
Ten Year Average (88 – 97)	2,670	39,882	23,588	7,697a	17,608	87,611

a Average of even years only

Appendix D.4. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1998.

Year	Species	Middle Fork Tower/Weir Estimate	Middle Fork Aerial Survey Count as a Percentage of Weir Est.	North Fork Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Total Run Size Estimate	Exploitation <sup>a</sup> Rate (% of Run)
1981	Chinook	3,688	-b	7,766 <sup>c</sup>	1,409	7,190	20,053	43%
	Sockeye	49,108	-b	100,029 <sup>c</sup>	3,511 <sup>d</sup>	40,273	192,921	23%
	Chum	21,827	-b	53,799 <sup>c</sup>	-	13,642	89,268	15%
1982	Chinook	1,395	-b	2,937 <sup>c</sup>	1,236	9,476	15,044	71%
	Sockeye	56,255	-b	114,587 <sup>c</sup>	2,754 <sup>d</sup>	38,877	212,473	20%
	Chum	6,767	-b	16,679 <sup>c</sup>	-	13,829	37,275	37%
1983	Chinook	6,022	36%	14,398	1,066	14,117	35,603	43%
	Sockeye	25,813	22%	69,955	1,518 <sup>d</sup>	11,716	109,002	12%
	Chum	15,548	-b	38,323 <sup>c</sup>	-	6,766	60,637	11%
1984	Chinook	3,260	35%	8,743	629	8,612	21,244	43%
	Sockeye	32,053	27%	67,213	964	15,474	115,704	14%
	Chum	19,003	35%	117,739	189	14,340	151,271	10%
1985	Chinook	2,831	70%	7,979	426	5,793	17,029	37%
	Sockeye	24,131	11%	50,481	704	6,698	82,014	9%
	Chum	10,367	32%	25,025	348	4,784	40,524	13%
1986	Chinook	2,092	57%	4,094	555	2,723	9,464	35%
	Sockeye	51,069	28%	93,228	942	25,112	170,351	15%
	Chum	14,764	38%	51,910	191	10,355	77,220	14%
1987	Chinook	2,272	100%	4,490	816	3,357	10,935	38%
	Sockeye	28,871	85%	51,989	955	27,758	109,573	26%
	Chum	17,517	58%	37,802	578	20,381	76,278	27%
1988	Chinook	2,712	39%	5,419	310	4,964	13,405	39%
	Sockeye	15,799	30%	38,319	1065	36,368	91,551	41%
	Chum	20,799	21%	39,501	448	33,059	93,807	36%
1989	Chinook	1,915	67%	2,891	467	2,966	8,239	42%
	Sockeye	21,186	60%	35,476	869	19,299	76,830	26%
	Chum	10,380	28%	15,495	760	13,622	40,257	36%
1990	Chinook	3,636	-b	7,656 <sup>c</sup>	682	3,303	15,277	26%
	Sockeye	31,679	-b	64,528 <sup>c</sup>	905	35,823	132,935	28%
	Chum	6,410	-b	15,799 <sup>c</sup>	342	13,194	35,745	38%
1991 <sup>e</sup>	Chinook	1,952	-b	4,521 <sup>c</sup>	682	912	8,067	20%
	Sockeye	47,397	-b	96,544 <sup>c</sup>	900	39,838	184,679	22%
	Chum	27,525	-b	67,844 <sup>c</sup>	106	15,892	111,367	14%
1992	Chinook	1,903	61%	1,854	252	3,528	7,537	50%
	Sockeye	27,268	21%	52,501	905	39,194	119,868	33%
	Chum	22,023	19%	16,084	662	18,520	57,289	33%

-Continued-



Appendix D.6. Summary of historical commercial harvest by period, Goodnews Bay District, chinook salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.0000
6/13	1	1,252	1,252	1,252	0.0153
6/14	0	-	-	-	0.0153
6/15	1	197	197	197	0.0177
6/16	2	251	1,096	674	0.0342
6/17	1	362	362	362	0.0387
6/18	3	387	1,706	1,158	0.0785
6/19	2	296	390	343	0.0869
6/20	5	139	2,642	404	0.1382
6/21	2	1,298	1,535	1,417	0.1729
6/22	2	792	1,591	1,192	0.2021
6/23	3	583	1,639	788	0.2390
6/24	3	476	988	620	0.2645
6/25	4	340	1,896	1,154	0.3202
6/26	3	0	416	352	0.3296
6/27	5	173	3,944	388	0.4091
6/28	5	307	1,307	807	0.4575
6/29	4	330	921	686	0.4896
6/30	7	242	1,551	460	0.5478
7/01	2	77	1,156	617	0.5629
7/02	8	166	710	305	0.5978
7/03	4	156	1,065	328	0.6208
7/04	3	177	2,301	637	0.6589
7/05	8	95	1,809	290	0.7053
7/06	5	100	496	243	0.7218
7/07	9	132	1,119	316	0.7757
7/08	8	93	495	169	0.7964
7/09	6	99	351	139	0.8111
7/10	5	156	326	203	0.8248
7/11	8	53	408	175	0.8434
7/12	4	145	737	320	0.8620
7/13	6	66	182	131	0.8708
7/14	7	54	514	130	0.8881
7/15	7	0	354	90	0.8992
7/16	7	54	294	77	0.9092
7/17	4	65	210	116	0.9154
7/18	7	0	217	71	0.9222
7/19	4	33	71	64	0.9250
7/20	7	38	192	84	0.9339
7/21	6	35	68	58	0.9379
7/22	4	19	228	66	0.9426
7/23	8	17	97	36	0.9466
7/24	5	20	77	44	0.9493
7/25	8	0	82	27	0.9526
7/26	4	0	41	21	0.9536

-Continued-

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	9	19	122	32	0.9594
7/28	5	5	22	21	0.9603
7/29	6	15	157	29	0.9638
7/30	7	16	73	19	0.9663
7/31	5	7	34	20	0.9675
8/01	8	0	78	18	0.9704
8/02	6	6	27	20	0.9718
8/03	9	9	102	24	0.9761
8/04	5	6	23	12	0.9769
8/05	8	6	54	18	0.9789
8/06	6	6	79	10	0.9804
8/07	4	8	43	16	0.9814
8/08	9	0	60	13	0.9832
8/09	4	7	21	15	0.9839
8/10	10	5	78	14	0.9866
8/11	5	5	20	9	0.9873
8/12	7	7	47	20	0.9891
8/13	6	0	36	5	0.9899
8/14	8	4	41	9	0.9911
8/15	6	5	26	11	0.9921
8/16	8	0	17	7	0.9929
8/17	7	2	22	7	0.9938
8/18	7	0	10	8	0.9942
8/19	7	3	14	8	0.9949
8/20	6	1	12	7	0.9954
8/21	9	0	11	3	0.9959
8/22	6	3	17	8	0.9965
8/23	5	0	9	6	0.9968
8/24	7	0	17	2	0.9973
8/25	6	0	13	4	0.9977
8/26	9	0	8	4	0.9981
8/27	5	0	13	3	0.9984
8/28	9	0	11	3	0.9987
8/29	6	2	9	4	0.9991
8/30	4	1	4	2	0.9992
8/31	8	0	6	1	0.9993
9/01	6	0	7	1	0.9994
9/02	7	0	5	2	0.9996
9/03	5	0	3	2	0.9997
9/04	5	0	6	1	0.9998
9/05	6	0	5	1	1.0000
9/06	3	0	0	0	1.0000
9/07	8	0	1	0	1.0000
9/08	4	0	2	0	1.0000
9/09	1	0	0	0	1.0000

Appendix D.7. Summary of historical commercial harvest by period, Goodnews Bay District, sockeye salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.0000
6/13	1	27	27	27	0.0000
6/14	0	-	-	-	0.0000
6/15	1	70	70	70	0.0002
6/16	2	125	696	411	0.0016
6/17	1	744	744	744	0.0028
6/18	3	281	596	348	0.0049
6/19	2	478	551	515	0.0066
6/20	5	102	1,989	523	0.0126
6/21	2	967	1,280	1,124	0.0164
6/22	2	569	1,074	822	0.0192
6/23	3	1,029	2,701	1,466	0.0280
6/24	3	596	2,120	1,892	0.0358
6/25	4	852	2,087	1,348	0.0453
6/26	3	0	1,909	1,719	0.0514
6/27	5	685	3,040	1,664	0.0669
6/28	5	2,008	4,163	2,932	0.0915
6/29	4	1,412	3,323	1,763	0.1055
6/30	7	2,037	8,143	4,651	0.1604
7/01	2	1,143	3,376	2,260	0.1680
7/02	8	1,818	8,198	3,673	0.2214
7/03	4	1,427	5,510	2,565	0.2418
7/04	3	1,598	7,674	2,154	0.2612
7/05	8	1,254	5,195	2,854	0.3041
7/06	5	2,346	7,886	3,352	0.3423
7/07	9	2,057	6,283	3,026	0.3970
7/08	8	1,231	6,261	3,981	0.4486
7/09	6	2,167	4,518	3,446	0.4839
7/10	5	1,759	8,140	3,217	0.5190
7/11	8	1,397	3,898	3,068	0.5585
7/12	4	1,444	16,753	3,664	0.6017
7/13	6	2,046	5,275	3,538	0.6392
7/14	7	1,039	4,876	2,812	0.6715
7/15	7	0	8,860	2,801	0.7113
7/16	7	902	4,969	2,071	0.7400
7/17	4	1,598	3,936	3,310	0.7606
7/18	7	0	3,049	1,673	0.7781
7/19	4	1,683	2,830	2,422	0.7939
7/20	7	395	3,852	1,679	0.8171
7/21	6	507	2,559	1,309	0.8323
7/22	4	614	2,207	1,830	0.8432
7/23	8	162	3,966	852	0.8604
7/24	5	588	2,458	1,106	0.8713
7/25	8	0	1,678	472	0.8813
7/26	4	0	1,804	908	0.8874

-Continued-

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	9	166	2,903	534	0.9017
7/28	5	254	893	555	0.9060
7/29	6	342	1,312	720	0.9143
7/30	7	84	1,982	423	0.9231
7/31	5	300	803	380	0.9273
8/01	8	0	811	258	0.9313
8/02	6	204	969	485	0.9369
8/03	9	36	975	578	0.9452
8/04	5	142	739	190	0.9477
8/05	8	94	932	305	0.9534
8/06	6	34	498	282	0.9562
8/07	4	138	692	432	0.9591
8/08	9	0	926	260	0.9638
8/09	4	46	485	172	0.9653
8/10	10	18	659	273	0.9704
8/11	5	0	174	100	0.9713
8/12	7	17	564	238	0.9743
8/13	6	0	347	158	0.9758
8/14	8	4	382	199	0.9785
8/15	6	5	422	160	0.9805
8/16	8	0	322	110	0.9824
8/17	7	4	498	151	0.9845
8/18	7	0	318	72	0.9856
8/19	7	5	360	117	0.9873
8/20	6	0	214	118	0.9883
8/21	9	1	373	89	0.9901
8/22	6	7	353	118	0.9914
8/23	5	0	193	88	0.9922
8/24	7	1	244	48	0.9932
8/25	6	0	353	63	0.9943
8/26	9	0	204	66	0.9952
8/27	5	0	148	28	0.9957
8/28	9	1	186	51	0.9966
8/29	6	1	155	54	0.9972
8/30	4	0	171	36	0.9976
8/31	8	0	88	51	0.9982
9/01	6	0	158	47	0.9988
9/02	7	2	69	36	0.9992
9/03	5	0	72	21	0.9994
9/04	5	0	61	19	0.9996
9/05	6	0	61	0	0.9998
9/06	3	0	0	0	0.9998
9/07	8	0	63	3	1.0000
9/08	4	0	0	0	1.0000
9/09	1	0	0	0	1.0000

Appendix D.9. Summary of historical commercial harvest by period, Goodnews Bay District, coho salmon, 1981-1998.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
6/12	0	0	0	0	0.0000
6/13	1	0	0	0	0.0000
6/14	0	-	-	-	0.0000
6/15	1	0	0	0	0.0000
6/16	2	0	0	0	0.0000
6/17	1	0	0	0	0.0000
6/18	3	0	0	0	0.0000
6/19	2	0	0	0	0.0000
6/20	5	0	0	0	0.0000
6/21	2	0	0	0	0.0000
6/22	2	0	0	0	0.0000
6/23	3	0	0	0	0.0000
6/24	3	0	0	0	0.0000
6/25	4	0	0	0	0.0000
6/26	3	0	0	0	0.0000
6/27	5	0	0	0	0.0000
6/28	5	0	0	0	0.0000
6/29	4	0	0	0	0.0000
6/30	7	0	0	0	0.0000
7/01	2	0	0	0	0.0000
7/02	8	0	0	0	0.0000
7/03	4	0	0	0	0.0000
7/04	3	0	0	0	0.0000
7/05	8	0	0	0	0.0000
7/06	5	0	0	0	0.0000
7/07	9	0	0	0	0.0000
7/08	8	0	0	0	0.0000
7/09	6	0	0	0	0.0000
7/10	5	0	0	0	0.0000
7/11	8	0	0	0	0.0000
7/12	4	0	1	0	0.0000
7/13	6	0	0	0	0.0000
7/14	7	0	1	0	0.0000
7/15	7	0	13	0	0.0000
7/16	7	0	18	1	0.0001
7/17	4	0	0	0	0.0001
7/18	7	0	18	0	0.0001
7/19	4	0	11	3	0.0002
7/20	7	0	111	1	0.0004
7/21	6	1	18	5	0.0005
7/22	4	0	4	1	0.0005
7/23	8	1	195	15	0.0011
7/24	5	0	33	5	0.0012
7/25	8	0	632	52	0.0040
7/26	4	0	9	5	0.0040

-Continued-

## Appendix D.9. (Page 2 of 2)

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	9	0	1,059	68	0.0083
7/28	5	3	153	5	0.0088
7/29	6	5	343	47	0.0099
7/30	7	28	1,461	209	0.0171
7/31	5	24	364	38	0.0184
8/01	8	0	2,811	119	0.0260
8/02	6	96	1,491	500	0.0340
8/03	9	66	3,943	165	0.0469
8/04	5	35	949	553	0.0525
8/05	8	126	2,069	625	0.0650
8/06	6	316	4,275	696	0.0819
8/07	4	231	812	638	0.0867
8/08	9	97	3,090	1,133	0.1120
8/09	4	516	2,240	1,527	0.1241
8/10	10	463	4,198	1,218	0.1590
8/11	5	163	6,065	1,289	0.1825
8/12	7	1,225	6,488	1,766	0.2181
8/13	6	673	4,852	1,593	0.2443
8/14	8	1,325	4,644	2,198	0.2832
8/15	6	735	5,999	2,117	0.3176
8/16	8	462	7,321	2,392	0.3675
8/17	7	1,390	6,880	3,002	0.4179
8/18	7	0	3,864	2,038	0.4458
8/19	7	1,394	5,628	3,397	0.4957
8/20	6	68	9,590	1,675	0.5297
8/21	9	968	4,967	1,921	0.5743
8/22	6	629	6,731	3,556	0.6213
8/23	5	1,308	5,306	3,417	0.6557
8/24	7	1,597	5,520	3,467	0.7066
8/25	6	468	3,590	1,889	0.7323
8/26	9	15	3,249	1,918	0.7668
8/27	5	1,101	6,625	2,519	0.7981
8/28	9	1,016	3,529	1,896	0.8344
8/29	6	725	3,402	1,747	0.8580
8/30	4	1,483	3,730	1,986	0.8771
8/31	8	1,084	3,143	1,713	0.9106
9/01	6	604	2,778	1,415	0.9300
9/02	7	576	3,233	1,484	0.9519
9/03	5	377	2,309	1,167	0.9648
9/04	5	374	2,685	1,044	0.9779
9/05	6	0	2,202	684	0.9875
9/06	3	0	1,715	0	0.9911
9/07	8	0	2,310	221	1.0000
9/08	4	0	0	0	1.0000
9/09	1	0	0	0	1.0000

## **APPENDIX F**



Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Median harvest	Cumulative proportion harvest
7/27	9	0	1,059	68	0.0083
7/28	5	3	153	5	0.0088
7/29	6	5	343	47	0.0099
7/30	7	28	1,461	209	0.0171
7/31	5	24	364	38	0.0184
8/01	8	0	2,811	119	0.0260
8/02	6	96	1,491	500	0.0340
8/03	9	66	3,943	165	0.0469
8/04	5	35	949	553	0.0525
8/05	8	126	2,069	625	0.0650
8/06	6	316	4,275	696	0.0819
8/07	4	231	812	638	0.0867
8/08	9	97	3,090	1,133	0.1120
8/09	4	516	2,240	1,527	0.1241
8/10	10	463	4,198	1,218	0.1590
8/11	5	163	6,065	1,289	0.1825
8/12	7	1,225	6,488	1,766	0.2181
8/13	6	673	4,852	1,593	0.2443
8/14	8	1,325	4,644	2,198	0.2832
8/15	6	735	5,999	2,117	0.3176
8/16	8	462	7,321	2,392	0.3675
8/17	7	1,390	6,880	3,002	0.4179
8/18	7	0	3,864	2,038	0.4458
8/19	7	1,394	5,628	3,397	0.4957
8/20	6	68	9,590	1,675	0.5297
8/21	9	968	4,967	1,921	0.5743
8/22	6	629	6,731	3,556	0.6213
8/23	5	1,308	5,306	3,417	0.6557
8/24	7	1,597	5,520	3,467	0.7066
8/25	6	468	3,590	1,889	0.7323
8/26	9	15	3,249	1,918	0.7668
8/27	5	1,101	6,625	2,519	0.7981
8/28	9	1,016	3,529	1,896	0.8344
8/29	6	725	3,402	1,747	0.8580
8/30	4	1,483	3,730	1,986	0.8771
8/31	8	1,084	3,143	1,713	0.9106
9/01	6	604	2,778	1,415	0.9300
9/02	7	576	3,233	1,484	0.9519
9/03	5	377	2,309	1,167	0.9648
9/04	5	374	2,685	1,044	0.9779
9/05	6	0	2,202	684	0.9875
9/06	3	0	1,715	0	0.9911
9/07	8	0	2,310	221	1.0000
9/08	4	0	0	0	1.0000
9/09	1	0	0	0	1.0000

## **APPENDIX F**

Appendix F.1. Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1998.

Year	Number of Fishermen <sup>b</sup>	Number Caught <sup>a</sup>		Total Weight (lbs)		Total Value (\$)		
		Whitefish <sup>c</sup>	Burbot	Whitefish	Burbot	Whitefish	Burbot	Total
1977	3	718	0	d	0	952	0	952
1978	b	1,735	0	6,017	0	d	0	d
1979	b	3,219	0	11,211	0	d	0	d
1980	4	603	0	2,173	0	830	0	830
1981	4	1,197	0	4,620	0	2,310	0	2,310
1982	5	1,512	0	6,219	0	2,856	0	2,856
1983	0	0	0	0	0	0	0	0
1984	2	0	651	0	d	0	d	d
1985	5	555	1,829	2,275	2,016	1,137	455	1,593
1986	3	0	0	0	3,428	0	857	857
1987	4	417	0	1,260	0	1,008	0	1,008
1988	3	d	d	2,588	7	1,991	3	1,994
1989	7	178	282	583	270	501	597	1,098
1990	11	1,664	d	5,502	10	5,166	5	5,171
1991	5	1,413	41	2,442	256	2,412	197	2,609
1992	6	2,124	18	6,309	86	6,285	43	6,328
1993	5	2,509	0	5,208	0	4,898	0	4,898
1994	3	2,393	0	4,905	0	4,345	0	4,345
1995	1	d	0	2,363	0	2,507	0	2,507
1996	2	3,139	0	4,915	0	4,776	0	4,776
1997	14	4,447	0	5,770	0	4,832	0	4,832
1998	0	0	0	0	0	0	0	0

a Does not include catches incidental to the commercial salmon fishery.

b Does not include fisherman who delivered catches incidental to the commercial salmon fishery.

c Includes cisco, pike and blackfish (weight only).

d Data not available.

## **APPENDIX G**

Appendix G.1. Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1998.

<u>Year</u>	<u>Number of Fishermen</u>	<u>Species</u>	<u>Number Caught</u>	<u>Total weight (lbs)</u>	<u>Total value (\$)</u>
1988	4	Tom Cod <sup>a</sup>	b	439	878
1989	2	Tom Cod	b	591	1,180
1990	1	Tom Cod	300	221	442
1991	2	Tom Cod	b	1,356	2,690
1992	1	Tom Cod	b	303	303
1993	0	-- --	0	0	0
1994	1	Tom Cod	b	100	160
1995	0	-- --	0	0	0
1996	1	Tom Cod	b	713	1,426
1997	1	Tom Cod	b	250	500
1998	0	-- --	0	0	0

a Tom Cod is the local name for Saffron Cod (Eleginus gracilis).

b Data not available

## Appendix H.1. (2 of 2)

District	Estimated Biomass	Harvest				Roe% <sup>a</sup>	Estimated Value	Exploitation Rate
	(st)	Sac-roe	Bait	Waste	Total		(\$1000's)	(%)
1989								
Security Cove	2,830	544	10	0	554	9.4	256	19.6
Goodnews Bay	4,044	453	162	0	616	8.4	335	15.2
Cape Avinof	2,780	90	39	0	129	8.0	54	4.6
Nelson Is.	3,316	122	100	11	233	8.5	57	7.0
Nunivak Is.	617	79	37	0	116	9.4	42	18.8
Total	13,587	1,289	347	11	1,647	8.9	744	12.1
1988								
Security Cove	4,906	324	0	0	324	9.3	362	6.6
Goodnews Bay	4,479	473	10	0	483	8.0	463	10.8
Cape Avinof	4,108	348	0	0	348	8.6	264	8.5
Nelson Is.	7,152	760	15	0	775	9.2	713	10.8
Nunivak Is.	2,800	-	-	-	-	-	-	-
Total	23,445	1,905	25	0	1,930	8.8	1,802	8.2
1987								
Security Cove	2,300	312	1	0	313	9.7	242	13.6
Goodnews Bay	2,000	179	142	0	321	7.3	133	16.1
Nelson Is.	8,100	915	8	0	923	9.2	661	11.4
Nunivak Is.	4,400	254	160	0	414	7.8	231	9.4
Total	16,800	1,660	311	0	1,971	8.9	1,267	11.7
1986								
Security Cove	3,700	747	4	0	751	11.2	535	20.3
Goodnews Bay	3,000	554	3	0	557	10.4	325	18.6
Nelson Is.	7,300	852	34	0	886	10.3	428	12.1
Nunivak Is.	6,000	469	42	0	511	10.1	213	8.5
Total	20,000	2,622	83	0	2,705	10.5	1,501	13.5
1985								
Security Cove	4,900	703	0	30	733	10.1	355	15.0
Goodnews Bay	4,300	711	0	13	724	8.7	309	16.8
Nelson Is.	9,500	967	10	0	977	10.6	527	10.3
Nunivak Is.	5,700	349	9	0	358	8.9	146	6.3
Total	24,400	2,730	19	43	2,792	9.8	1,337	11.4
1984								
Security Cove	5,100	325	0	10	335	11.8	110	6.6
Goodnews Bay	4,100	667	0	50	717	10.1	168	17.5
Total	9,200	992	0	60	1,052	10.7	278	11.4
1983								
Security Cove	6,400	966	107	0	1,073	9.4	443	16.8
Goodnews Bay	3,200	426	9	0	435	9.4	185	13.6
Total	9,600	1,392	116	0	1,508	9.4	628	15.7
1982								
Security Cove	5,100	707	106	0	813	9.3	271	15.9
Goodnews Bay	2,600	437	49	0	486	9.5	188	18.7
Total	7,700	1,144	155	0	1,299	9.4	459	16.9
1981								
Security Cove	8,300	1,150	23	0	1,173	8.1	347	14.1
Goodnews Bay	4,300	558	99	0	657	7.7	196	15.3
Total	12,600	1,708	122	0	1,830	8.0	543	14.5

Appendix H.2 Number of buyers and fishermen participating in Kuskokwim  
Area Pacific herring fisheries, Alaska, 1981-1998.

Year	District	Number of Buyers	Number of Fishermen	Number of Deliveries
<u>1998</u>	Security Cove	9	78	255
	Goodnews Bay	2	84	580
	Cape Avinof	2	109	561
	Nelson Island	3	86	829
	Nunivak Island	1	7	7
<u>1997</u>	Security Cove	14	222	528
	Goodnews Bay	3	139	933
	Cape Avinof	2	145	560
	Nelson Island	3	105	348
	Nunivak Island	1	12 <sup>a</sup>	0
<u>1996</u>	Security Cove	14	326	601
	Goodnews Bay	5	182	1,186
	Cape Avinof	2	161	833
	Nelson Island	3	109	515
	Nunivak Island	2	24	85
<u>1995</u>	Security Cove	12	106	257
	Goodnews Bay	4	127	878
	Cape Avinof	2	93	537
	Nelson Island	4	100	575
	Nunivak Island	2	13	46
<u>1994</u>	Security Cove	No commercial opening		
	Goodnews Bay	2	103	683
	Cape Avinof	1	85	502
	Nelson Island	3	104	409
	Nunivak Island	1	12	14
<u>1993</u>	Security Cove	1	9	9
	Goodnews Bay	3	63	705
	Cape Avinof	1	97	478
	Nelson Island	1	73	487
	Nunivak Island	No commercial opening		
<u>1992</u>	Security Cove	6	58	178
	Goodnews Bay	3	78	375
	Cape Avinof	2	121	335
	Nelson Island	3	85	222
	Nunivak Island	1	14	23
<u>1991</u>	Security Cove	6	52	100
	Goodnews Bay	2	103	137
	Cape Avinof	1	137	463
	Nelson Island	No commercial opening		
	Nunivak Island	2	17	31

-continued-



## Appendix H.2 (2 of 2)

Year	District	Number of Buyers	Number of Fishermen	Number of Deliveries
<u>1990</u>	Security Cove	9	52	77
	Goodnews Bay	3	126	530
	Cape Avinof	1	101	109
	Nelson Island	No commercial opening		
	Nunivak Island	No commercial opening		
<u>1989</u>	Security Cove	8	104	108
	Goodnews Bay	6	138	533
	Cape Avinof	3	147	335
	Nelson Island	4	162	438
	Nunivak Island	3	45	210
<u>1988</u>	Security Cove	4	31	51
	Goodnews Bay	6	60	309
	Cape Avinof	1	98	485
	Nelson Island	7	174	547
	Nunivak Island	No commercial opening		
<u>1987</u>	Security Cove	8	65	67
	Goodnews Bay	4	117	191
	Nelson Island	9	235	633
	Nunivak Island	4	61	341
<u>1986</u>	Security Cove	11	88	199
	Goodnews Bay	5	104	319
	Nelson Island	4	163	1,099
	Nunivak Island	5	36	284
<u>1985</u>	Security Cove	6	107	268
	Goodnews Bay	5	83	420
	Nelson Island	6	143	776
	Nunivak Island	5	37	273
<u>1984</u>	Security Cove	4	38	86
	Goodnews Bay	4	130	390
<u>1983</u>	Security Cove	6	94	312
	Goodnews Bay	4	84	225
<u>1982</u>	Security Cove	3	107	250
	Goodnews Bay	3	84	297
<u>1981</u>	Security Cove	7	113	311
	Goodnews Bay	5	175	479

a Estimated number of permit holders

Appendix H.3. Commercial harvest, effort and value of Pacific herring in  
Kuskokwim Area fishing districts, Alaska, 1981-1998.

Year	District	Estimated Harvest (st)	Number of permits	Hours fished	CPUE <sup>a</sup> (st)	Estimated Value	Income per permit
1998	Security Cove	1,012	78	28.5	0.46	\$202,340	\$2,594.10
	Goodnews Bay	831	84	79	0.13	\$166,220	\$1,978.81
	Cape Avinof	656	109	44	0.14	\$131,120	\$1,202.94
	Nelson Is.	1,250	86	76	0.18	\$235,900	\$2,743.02
	Nunivak Is.	202	7	6	0.05	\$440	\$62.86
1997	Security Cove	892	222	10.5	0.38	\$221,000	\$995
	Goodnews Bay	805	139	65.0	0.09	\$228,000	\$1,640
	Cape Avinof	687	145	26.0	0.18	\$157,000	\$1,083
	Nelson Is.	778	105	10.0	0.74	\$198,000	\$1,886
	Nunivak Is.	-	12	70.0	0.00	\$0	\$0
1996	Security Cove	1,859	326	5.5	1.04	#####	\$3,841
	Goodnews Bay	1,204	182	45.0	0.15	\$893,900	\$4,912
	Cape Avinof	820	161	57.0	0.09	\$659,280	\$4,095
	Nelson Is.	1,031	109	25.0	0.38	\$676,624	\$6,208
	Nunivak Is.	101	24	256.0	0.02	\$38,234	\$1,593
1995	Security Cove	1,292	106	12.0	1.02	\$956,000	\$9,019
	Goodnews Bay	1,054	127	56.0	0.15	\$848,000	\$6,677
	Cape Avinof	485	93	48.0	0.11	\$363,000	\$3,903
	Nelson Is.	1,113	100	28.0	0.40	\$710,000	\$7,100
	Nunivak Is.	41	13	387.0	0.01	\$22,000	\$1,692
1994	Security Cove	--	--	--	--	--	--
	Goodnews Bay	1,062	103	38.0	0.27	\$391,000	\$3,796
	Cape Avinof	427	85	62.0	0.08	\$156,000	\$1,835
	Nelson Is.	717	104	26.0	0.27	\$235,000	\$2,260
	Nunivak Is.	14	12	6.0	0.19	\$4,000	\$333
1993	Security Cove	5	9	24.5	0.02	\$2,000	\$222
	Goodnews Bay	954	63	123.0	0.12	\$293,000	\$4,651
	Cape Avinof	215	97	106.0	0.02	\$75,000	\$773
	Nelson Is.	739	73	63.5	0.16	\$198,000	\$2,712
	Nunivak Is.	--	--	--	--	--	--
1992	Security Cove	834	58	34.0	0.42	\$285,000	\$4,914
	Goodnews Bay	740	78	29.0	0.33	\$286,000	\$3,667
	Cape Avinof	452	121	12.0	0.31	\$178,000	\$1,471
	Nelson Is.	246	85	10.0	0.29	\$78,000	\$918
	Nunivak Is.	27	14	6.0	0.32	\$4,000	\$286
1991	Security Cove	570	52	12.0	0.91	\$208,000	\$4,000
	Goodnews Bay	263	103	4.0	0.64	\$93,000	\$903
	Cape Avinof	267	137	28.0	0.07	\$94,000	\$686
	Nelson Is.	--	--	--	--	--	--
	Nunivak Is.	59	17	12.0	0.29	\$9,000	\$529
1990	Security Cove	234	52	7.0	0.64	\$94,000	\$1,808
	Goodnews Bay	455	126	32.0	0.11	\$314,000	\$2,492
	Cape Avinof	50	101	3.0	0.17	\$35,000	\$347
	Nelson Is.	--	--	--	--	--	--
	Nunivak Is.	--	--	--	--	--	--

- continued -

## Appendix H.3. (2 of 2)

Year	District	Estimated Harvest (st)	Number of permits	Hours fished	CPUE <sup>a</sup> (st)	Estimated Value	Income per permit
1989	Security Cove	554	104	4.0	1.33	\$256,000	\$2,462
	Goodnews Bay	616	138	50.0	0.09	\$335,000	\$2,428
	Cape Avinof	129	147	194.0	0.00	\$54,000	\$367
	Nelson Is.	233	162	15.0	0.10	\$57,000	\$352
	Nunivak Is.	116	45	186.0	0.01	\$42,000	\$933
1988	Security Cove	324	31	23.5	0.44	\$362,000	\$11,677
	Goodnews Bay	483	60	40.0	0.20	\$463,000	\$7,717
	Cape Avinof	348	98	88.5	0.04	\$264,000	\$2,694
	Nelson Is.	775	174	7.5	0.59	\$713,000	\$4,098
	Nunivak Is.	--	--	--	--	--	--
1987	Security Cove	313	65	13.0	0.37	\$242,000	\$3,723
	Goodnews Bay	321	117	11.0	0.25	\$133,000	\$1,137
	Nelson Is.	923	235	6.0	0.65	\$661,000	\$2,813
	Nunivak Is.	414	61	39.0	0.17	\$231,000	\$3,787
1986	Security Cove	751	88	73.0	0.12	\$535,000	\$6,080
	Goodnews Bay	557	104	53.0	0.10	\$325,000	\$3,125
	Nelson Is.	886	163	40.0	0.14	\$428,000	\$2,626
	Nunivak Is.	511	36	156.0	0.09	\$213,000	\$5,917
1985	Security Cove	733	107	125.0	0.05	\$335,000	\$3,131
	Goodnews Bay	724	83	130.0	0.07	\$309,000	\$3,723
	Nelson Is.	977	143	44.0	0.16	\$527,000	\$3,685
	Nunivak Is.	358	37	228.0	0.04	\$146,000	\$3,946
1984	Security Cove	335	38	345.0	0.03	\$110,000	\$2,895
	Goodnews Bay	717	130	139.0	0.04	\$168,000	\$1,292
1983	Security Cove	1,073	94	87.0	0.13	\$443,000	\$4,713
	Goodnews Bay	435	84	278.0	0.02	\$185,000	\$2,202
1982	Security Cove	813	107	302.0	0.03	\$271,000	\$2,533
	Goodnews Bay	486	84	314.0	0.02	\$188,000	\$2,238
1981	Security Cove	1,173	113	90.0	0.12	\$347,000	\$3,071
	Goodnews Bay	657	175	133.0	0.03	\$196,000	\$1,120

a CPUE = catch per permit per hour fished

**APPENDIX S**

# Appendix S. 1. 1998 Kuskokwim Area subsistence salmon harvest calendar.

Dear Subsistence Fishers:

Please write in the number of salmon that people in your household caught for subsistence. Include all subsistence salmon that were caught, including those you gave to others and those you may have caught for dog food. DO NOT include salmon that you sold when commercial fishing.

Our address is on the back of this calendar. When finished fishing, you can fold the calendar so that our return address is visible. DO NOT PUT POSTAGE ON THE CALENDAR WHEN YOU RETURN IT TO US. We have paid the postage.

This calendar is sent to you by the Subsistence Division of the Alaska Department of Fish and Game in Bethel.

NAME


Bulk Rate  
U. S. Postage  
Paid  
Fairbanks, AK  
Permit No. 99

Thank you for helping to document subsistence harvests. If you have any questions, please call (907) 543-31100.



## MAY 1998

## SUBSISTENCE SALMON CALENDAR

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	17	18	19	20	21	22	23
TARYAQVAK =	King _____	King _____	King _____	King _____	King _____	King _____	King _____
IQALLUK =	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
SAYAK =	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	24	25	26	27	28	29	30
CHINOOK =	King _____	King _____	King _____	King _____	King _____	King _____	King _____
	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
SOCKEYE =	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	31	 <p>"This year, for the first time, a comprehensive survey of the subsistence catch on the Kuskokwim was made from McGrath downriver to Napakiak. The harvest consisted of an estimated 19,457 kings, 70,5580 reds, and 286,487 chum salmon. The largest number of people's fishing came from the area between Kwethluk and Napakiak." 1996 Annual Report, Alaska Dept. Fish &amp; Game</p>					
	King _____						
	Chum _____						
	Red _____						

## JUNE 1998

## SUBSISTENCE SALMON CALENDAR

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5	6
		King _____	King _____	King _____	King _____	King _____	King _____
		Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
		Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	7	8	9	10	11	12	13
TARYAQVAK =	King _____	King _____	King _____	King _____	King _____	King _____	King _____
IQALLUK =	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
SAYAK =	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	14	15	16	17	18	19	20
CHINOOK =	King _____	King _____	King _____	King _____	King _____	King _____	King _____
	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
SOCKEYE =	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	21	22	23	24	25	26	27
	King _____	King _____	King _____	King _____	King _____	King _____	King _____
	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____	Chum _____
	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____	Red _____
	28	29	30	<p>"There were 150,000 small salmon dried in 15 native villages between Bethel and the sea, allowing an average of 1,000 for each family. One-half of these are sold or bartered for food or other articles needed, leaving the rest for home consumption."</p> <p>US Bureau of Fisheries 1922</p>			
	King _____	King _____	King _____				
	Chum _____	Chum _____	Chum _____				
	Red _____	Red _____	Red _____				

## JULY 1998

## SUBSISTENCE SALMON CALENDAR

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	<p>"Lake Telaquana is the only lake in the Kuskokwim drainage that has been found to contain red salmon. It is probable that it and Two Lakes at the head of the Necones River support all of the red salmon run in the Kuskokwim." 1990 Annual Report, Alaska Dept. of Fish and Game</p>						
	1	2	3	4	5	6	7
	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____
TARYAQVAK =	8	9	10	11	12	13	14
IQALLUK =	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____
SAYAK =	15	16	17	18	19	20	21
CHINOOK =	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____
SOCKEYE =	22	23	24	25	26	27	28
	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____	King _____ Chum _____ Red _____
QAKRYAK =	29	30	31	1	2	3	4
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
SILVER =	5	6	7	8	9	10	11
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____

## AUGUST 1998

## SUBSISTENCE SALMON CALENDAR

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	<p>"According to a knowledgeable Nikotai elder, fishwheels were first introduced to the upper Kuskokwim in 1914 by an early trader near Wilson Slough, below present day McGrath after he observed wheels on the Yukon River near Anvik." - Natural Resource Utilization of Four Upper Kuskokwim Communities by Jeff Stokes</p>						
	1	2	3	4	5	6	7
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
TARYAQVAK =	8	9	10	11	12	13	14
IQALLUK =	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
SAYAK =	15	16	17	18	19	20	21
QAKRYAK =	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
CHINOOK =	22	23	24	25	26	27	28
SOCKEYE =	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
SILVER =	29	30	31	1	2	3	4
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____

## SEPTEMBER 1998

## SUBSISTENCE SALMON CALENDAR

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	<p>"Two white fishermen and 343 natives fished the river for local requirements using 805 gill nets of 12,085 fathoms, 55 wheels and several small boats. The product consisted of 5 barrels of pickled kings, 350 tons of dried chums and 31 tons of dried cohos." US Bureau of Fisheries 1929</p>						
	1	2	3	4	5	6	7
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
IQALLUK =	8	9	10	11	12	13	14
SOCKEYE =	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
SILVER =	15	16	17	18	19	20	21
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____
	22	23	24	25	26	27	28
	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____	King _____ Chum _____ Red _____ Coho _____

Appendix S. 2. 1998 Kuskokwim Area subsistence salmon harvest survey form.

Division of Subsistence, Bethel		COMM. ID# _____	
Chinook = "taryaqvak,"	Chum = "Iqalluk,"	Sockeye = "sayak,"	Coho = "qakityaq"
<b>KUSSKOKWIM AREA 1998</b>		<b>HHID#</b> _____	
<b>POST-SEASON SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY</b>			
<small>* (Questions marked with an asterisk are asked of all households interviewed) Ik</small>			
Community: _____		Household Head Name: _____	
Survey Date: <u>10 11</u> , 1998		Name of Person Interviewed: HH, _____	
Interviewer: <u>SM</u> <u>RK</u>		Household P.O. Box: _____	
Was this household in community last year?: No _____ Yes _____			
<b>*1. Did this household catch salmon for subsistence use this year?</b> No _____ (go to # 3) Yes _____			
<b>2. May I have your salmon calendar?</b> (If household fished and we don't already have or don't collect the calendar, go to # 7)			
Picked up by interviewer _____		Mailed it to ADFG _____	
(go to # 10)		Didn't get one _____	
		Lost or unavailable _____	
<b>*3. Does this household usually subsistence fish for salmon?</b> No _____ Yes _____			
<b>HOUSEHOLD DIDN'T FISH</b> (Household did not help harvest/catch salmon)			
<b>4. Did this household help another household process ("put up") salmon?</b>			
No _____ (go to # 17)		Yes _____: (Names, HHIDs) _____	
<b>5. Please estimate how many salmon all of you processed ("put up").</b>			
CHINOOK ("kings") _____	CHUM ("dogs") _____	SOCKEYEE ("reds") _____	COHO ("silvers") _____
			Could not estimate _____
<b>6. Please estimate how many salmon were for your household only.</b>			
CHINOOK ("kings") _____	CHUM ("dogs") _____	SOCKEYEE ("reds") _____	COHO ("silvers") _____
			Could not estimate _____
(Go to Question 17) _____			
<b>HOUSEHOLD FISHED. ADF&amp;G DOES NOT HAVE CALENDAR</b>			
<b>7. Did other households fish with you?</b> No _____ Yes _____: (Names, HHIDs) _____			
<b>8. Please estimate how many salmon your household (or all households together) caught.</b> (Ask about salmon already eaten, frozen, given to other households, and dog food)			
CHINOOK ("kings") _____	CHUM ("dogs") _____	SOCKEYEE ("reds") _____	COHO ("silvers") _____
			Could not estimate _____
Salmon are included with Household _____ (HHID)			
<b>9. Please estimate how many salmon were for your household only.</b>			
CHINOOK ("kings") _____	CHUM ("dogs") _____	SOCKEYEE ("reds") _____	COHO ("silvers") _____
			All _____ Could not estimate _____
(Go to Question 15) _____			
<b>HOUSEHOLD FISHED. ADF&amp;G DOES HAVE CALENDAR</b>			
<b>10. Are all of the salmon this household caught written on the calendar?</b> (Ask about and include salmon already eaten, frozen, given to other households, and dog food)			
No _____		Yes _____ (go to # 12)	
<b>11. How many additional salmon, not written on the calendar, were caught?</b>			
CHINOOK ("kings") _____	CHUM ("dogs") _____	SOCKEYEE ("reds") _____	COHO ("silvers") _____
			Could not estimate _____
<b>12. Did other households fish with you?</b> No _____ (go to # 15) Yes _____: (Names, HHIDs) _____			
(This Block is continued on back side)			

COFFING, dSFORMKB98 DOC, 1 20 PM, September 23, 1998.



Appendix S. 2. Continued (page 2 of 2).

13. Are the salmon they caught written on your calendar? No ☐ Yes ☐

14. Please estimate how many salmon were for your household only.

CHINOOK  CHUM  SOCKEYE  COHO  All  Could not estimate

(Go to Question 15)

**FISHING GEAR** (For subsistence fishing households only)

15A. What type(s) of fishing gear was used for catching subsistence salmon this year?

Drift net , Set Net , Rod and Reel , Fishwheel , Spear , Sein .

15B. What mesh size (gill net) did you use when catching King Salmon this year?  (inches)

16. How many salmon did your household catch and keep with Rod and Reel this year?

CHINOOK  CHUM  SOCKEYE  COHO

**COMMERCIAL FISHING**

\*17. Does this household commercial fish? No ☐ (go to # 21), Yes ☐

If yes, where?  Kuskokwim River or Bay  Yukon Area  Bristol Bay

18. Were all of the salmon caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All were sold ☐ Some were used for subsistence ☐

19. How many commercially caught salmon were used for subsistence?

CHINOOK  CHUM  SOCKEYE  COHO

20. Are those salmon listed on the calendar or included in the catch numbers you gave me?

Yes ☐, No ☐

**HOUSEHOLD SIZE**

\*21. How many people live in this household?

**DOG FOOD** (For subsistence fishing households only)

22. Did this household catch salmon for dog food?

No ☐ (go to # 26) Only backbones/heads/guts/scraps ☐ (go to # 26)

Yes ☐

23. How many salmon?

CHUM   
("dogs")

SOCKEYE   
("reds")

COHO   
("silvers")

24. Are the salmon caught for the dogs included on your calendar or in the estimates you gave me?

Yes ☐, No ☐

25. How many dogs does this household have?

26. (For subsistence fishing households only)

How was subsistence salmon fishing for your household this year?

Kings: ☐ Very Good ☐ Average ☐ Poor If Poor, why?

Chums: ☐ Very Good ☐ Average ☐ Poor If Poor, why?

Sockeye: ☐ Very Good ☐ Average ☐ Poor If Poor, why?

Coho: ☐ Very Good ☐ Average ☐ Poor If Poor, why?

\*27. What could Fish and Game do to make subsistence fishing better for you? (regulations, etc)

A summary of the subsistence fishing survey will be sent out next spring (April).

Appendix S.3. 1998 Kuskokwim Area subsistence salmon harvest survey postcard.

Dear Kuskokwim Area Resident,

**Please take a moment to answer the questions on the back side of this card and drop it in the mail to us.** No stamp is necessary, postage is already paid. We will mail you a subsistence salmon harvest summary in Spring after the survey data is compiled.

We appreciate your help to document subsistence salmon harvests. We use this information to help the Board of Fisheries and the Department of Fish and Game make informed management decisions affecting the Kuskokwim Area. Your household harvest information remains confidential. Please call if you have any questions.

Thank you,

Subsistence Division  
Room 214, BNC Complex  
Bethel (543-3100)

(correct your address if necessary)

NAME: \_\_\_\_\_

P.O. BOX: \_\_\_\_\_

CITY, STATE: \_\_\_\_\_

ZIPCODE: \_\_\_\_\_

**Did your household harvest salmon for subsistence use this year?**

(include any salmon kept for subsistence when commercial fishing) Yes \_\_\_ No \_\_\_

**How many subsistence salmon did your household harvest?**

(include salmon eaten, given away, frozen, dried, smoked, canned, or for dogfood)

Chinook \_\_\_\_\_  
(King salmon)

Chum \_\_\_\_\_  
(Dog salmon)

Sockeye \_\_\_\_\_  
(Red salmon)

Coho \_\_\_\_\_  
(Silver salmon)

**What type(s) of gear did your household use to catch subsistence salmon ?**

Set net \_\_\_\_\_ Drift net \_\_\_\_\_ Fishwheel \_\_\_\_\_ Rod and reel \_\_\_\_\_

**How was subsistence salmon fishing for your household this year?**

King:	Very good	Average	Poor, If Poor, why _____
Sockeye:	Very good	Average	Poor, If Poor, why _____
Chum:	Very good	Average	Poor, If Poor, why _____
Coho:	Very good	Average	Poor, If Poor, why _____